Fight, Flight, Freeze: The Impact of a Dyslexia Simulation on Preservice Teachers

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Introduction

An estimated 15% to 20% of the population in the United States have dyslexia but have not been formally diagnosed (Flink, 2014; Kang et al., 2016). Therefore, elementary school teachers will have an average of three to six students in their classroom that exhibit some form of dyslexia and that number only increases for middle and high school teachers (Colson, 2013). As a result, there is a need for teachers and other school personnel to be highly equipped to support students with dyslexia who need targeted, individualized instruction. However, research indicates a lack of thorough training to prepare teachers to recognize, assess, and instruct students with dyslexia (Hott et al., 2015; Mills, 2018). As a result, many teachers will have minimal knowledge about the experiences of their students with dyslexia.

Literature Review

Dyslexia: Characteristics and Teacher Preparation

The widely accepted definition of dyslexia is "a statement of neurobiological origin with characteristics that include difficulties with letter-sound correspondence, accurate and fluent word recognition, poor spelling, and limited decoding abilities" (Hott et al., 2015). Therefore, dyslexia is a brain-based disorder that causes deficits, in varying degrees of severity, which impact a person's ability to properly hear distinctive letter sounds as well as blended letter sounds that make up words. As a result, individuals with dyslexia often have difficulty with comprehension (Lyon, et al. 2003; Ness & Southall, 2010).

Based upon the prevalence of dyslexia, it is likely that all classrooms have students who have dyslexia and it is, therefore, necessary that all teachers are properly prepared to support the academic needs of students with dyslexia (Mills & Clarke, 2017). However, many students (including those identified and not identified with dyslexia) are not receiving the necessary intensive evidence-based instruction needed for academic success (Lyon & Weiser, 2009; Mills, 2018; Moats, 2004). This lack of targeted instruction may be due, in part, to a lack of training of teachers to effectively instruct students with dyslexia.

Therefore, training provided for preservice teacher candidates regarding what dyslexia is and how to support students who have it is essential (Mills & Clarke, 2017). Preservice teachers should be provided with up-to-date, accurate information on dyslexia (Washburn et al., 2017). This includes learning about the impact dyslexia has on the learning experience of students in the classroom through real-world simulations. However, little to no research exists on how a

simulated dyslexia experience impacts preservice teachers' understanding of the challenges faced by students with dyslexia.

The Fight, The Flight, and The Freeze

Students without dyslexia will experience a level of stressful situations from time to time, but students with dyslexia may experience profound struggles on a daily basis. Frydman & Mayor (2017) found that these types of stressful situations "inhibits executive functioning and commonly results in a fight-flight-freeze reaction" (p. 241). This fight-flight-freeze reaction is a result of the nervous system's defense strategy (Levine, 2010). In the fight and flight reactions, "cortisol and adrenaline are pumping, the heart is racing, hands are sweating and there is a feeling of panic and agitation" (Hartley & Henderson, 2018, p.142). When these two reactions occur, all of a person's energy in their body is directed to help either fight a predator or to run away as fast as possible (Hartley & Henderson, 2018). In a classroom, a student experiencing the fight response may display verbal aggression, oppositional behavior, limit testing, and/or physical aggression (Kahn & Vezzuto, 2017). In addition, a student experiencing the flight response may display acts of self-isolation, avoidance, escaping, and/or withdrawal (Kahn & Vezzuto, 2017). The third response, the freeze reaction, is similar to a dissociative state that acts as a person's ultimate emergency system (Porges, 2011). When a person experiences the "freeze" response, it slows down the heart-rate and induces shallow breathing (Porges, 2011). A student experiencing this response may exhibit looking dazed, daydreaming, forgetfulness, and/or shutting down emotionally (Kahn & Vezzuto, 2017).

The learning experience of students with dyslexia can create stressful situations where the fight, flight, or freeze responses may occur. As a result of these types of responses, their learning experience may be negatively impacted.

The Use of Simulations to Facilitate Learning

Simulations create a scenario-based environment, where participants interact with real-world situations (Andreu-Andrés & García-Casas, 2011). Studies have shown that simulations result in a deep level of learning that might otherwise not be attainable through traditional learning modes. Sitzmann (2011) found that individuals who learned through simulated experiences demonstrated higher self-efficacy and procedural knowledge.

Further, a study of 25 reviews of over 700 studies on the impact of the use of simulations found that simulation-based education contributes to students' learning in a number of ways when integrated into the curriculum (Cant & Cooper, 2017). Studies on simulation-based learning have found that they can be as effective as traditional learning modes to promote knowledge acquisition, content understanding, and concept learning (Li & Tsai, 2013; Warren et al., 2016).

From a teaching and learning perspective, student-centered, active-learning environments such as simulations can increase student engagement (Auman, 2011). Simulations motivate, engage and promote effective learning goals by providing opportunities for learners to actively experience different scenarios (Vlachopoulos & Makri, 2017).

Silvia (2012) notes that simulations help students apply the concepts they learn in class by connecting the theoretical issues with real-world situations, thus developing their analytical skills, and through comparing different viewpoints, which leads to enhanced critical thinking. Further, simulations encourage students to develop self-awareness (Silva, 2012).

The integration of simulations in the curriculum can serve as a supplement to existing teaching techniques or as a partial substitute for traditional teaching methods (Rutten et al., 2012). However, they can also be used as primary teaching tools to reach student learning outcomes. Lameras et al. (2016) notes that because simulations add variety in educational teaching approaches, student learning can be enhanced by their use.

Purpose of Study

Based upon the prevalence of students with dyslexia, the need for early diagnosis and intervention, the research indicating a lack of dyslexia training among preservice and inservice teachers, and the use of a simulation as an effective learning tool, the purpose of this study was to provide preservice teachers with an opportunity to engage in a simulation that provides a glimpse into the learning experience of students with dyslexia.

Methodology

Participants of this study consisted of 27 preservice teachers from a midsized university in the midwest. Prior to participating in this study, all participants had formal training on the characteristics, assessment, and interventions related to teaching students with dyslexia. The participants had an understanding of how to identify, assess, and instruct students with dyslexia. However, participants had not yet had an opportunity to explore the reality of the impact of dyslexia on the student's learning experience in a typical classroom.

This study provided these participants with the opportunity to experience characteristics of dyslexia through a simulated experience. The *Experience Dyslexia* simulation is research based and developed by the International Dyslexia Association. It was designed to increase awareness of the difficulties and frustrations that people with dyslexia often encounter with the goal of greater empathy and understanding as well as insight into working more effectively with individuals with dyslexia (IDA, 2018). The simulation is designed to be stressful and participants may become fatigued and/or emotional during the course of the experience. The IDA (2018) notes that the simulation does not intend to imply that teachers or parents deliberately make students with dyslexia frustrated, but the frustrations experienced in the simulation are typical of individuals with dyslexia.

The simulation consists of six learning stations that participants rotate through until each participant has completed all six stations. These stations simulate various tasks that typically occur in classrooms, including two reading, two writing, and two listening tasks. The two reading tasks consist of reading from a special primer and reading a mirror image of a text; the two writing tasks consist of tracing while looking at their hand in a mirror and writing with the non-dominant hand; and the listening tasks include taking notes with background noise and

taking a spelling test. Participants spend approximately ten minutes at each station followed by a short discussion with the station leader about the task.

Prior to beginning the simulation, participants were given information on three main reactions/responses they may experience during the simulation: fight, flight, or freeze. The characteristics of each type of possible reaction was discussed and participants were told they would be reflecting on their own fight/flight/freeze responses to each task.

Simulation - Station One

Station One (*Learn to Read*) simulated a reading problem found during the early learning stages of reading and also required oral reading of the passage in front of peers. The challenge of reading the story was to associate symbols with speech sounds in order to read the passage. This required participants to decode words on demand with limited instruction and comprehend them (in front of peers).

More specifically, in this task each participant was asked to associate symbols with speech sounds in order to read and comprehend a story (See Appendix A). Participants did not receive instruction on the sound/symbol association, and new words are introduced quickly as whole words so association of the individual symbols with their speech sounds is not taught. Each participant took a turn reading aloud, going around the group until the story was completed. In addition, per the implementation instructions of the simulation, the station facilitator created an additional pressure and discomfort to the participants by adding comments such as “You can do this!” and “Remember to pay attention to your fluency!” as the participants struggled to read the passage aloud in front of their peers.

Participants experience the difficulty students with dyslexia have when they cannot remember associations between graphemes (such as the letters *p* and *ch*) and their corresponding phonemes (speech sounds such as */p/* and */ch/*). These grapheme-phoneme associations, along with knowledge of morphemes (prefixes, bases, and suffixes, such as *re-* and *-ing*), are necessary for decoding and identifying new words. Learning grapheme-phoneme associations is often particularly difficult for students with dyslexia.

Simulation - Station Two

The second station (*Listen to Me*) presented participants with a difficult task that simulated the difficulty with listening and/or attention through an auditory figure-ground task. While listening to an audio recording, the participants had to discriminate between the important auditory information (the "figure") and the non-essential background noise (the "ground") while filling out a worksheet. The task simulates the difficulty students with dyslexia may experience when unable to tune out background noise, causing them to miss important information or directions.

The facilitator of this station added more distractions, per the simulation instructions, by peering over the participants’ shoulders to “check their work” and making additional noise as a student would hear in the typical classroom (rustling of papers, pencils being put down, chairs scooting,

etc.). This additional level of distraction made it even more challenging for participants to discriminate essential information from non-essential information.

Simulation - Station Three

Station Three (*Write with Mirrors*) simulated a beginning handwriting task with additional barriers to create a more realistic picture of what students with dyslexia might experience in the classroom. Participants were required to trace or form letters and numbers while looking at their writing hand in a mirror. This creates a very challenging task as the brain and hand are not in effective communication with each other when the addition of a mirror is used.

This task was a visual-motor task that simulates the difficulty students with dyslexia often have in writing letters and numbers. Students with dyslexia may not have the kinesthetic-motor memory for the unique sequence of movements required to successfully form each letter and number (where to place the pencil to begin, what direction to move, where to end) even if they have strong hand-eye coordination and drawing skills. The use of the mirror to complete this handwriting task offered participants the ability to see what occurs when the brain and hand have a lack of effective communication. In addition, as the participants traced and wrote letters and numbers, the facilitator of the station created additional pressure, per the simulation instructions, by making comments on student work such as “Watch your tracing…this needs to be neat” and “Don’t take too long” and “We will hang these on the wall for everyone to see.” This increased the amount of pressure placed on participants during this task.

Simulation - Station Four

Station 4 (*Name That Letter*) was a reading task that simulated the difficulty a student with dyslexia may have distinguishing visually similar letters (*b, d, g, p,* and *g*) and associating them with their correct names and speech sounds. The challenge of this task is to quickly decode words containing these confusing letters while also comprehending the passage. To simulate what a student with dyslexia might experience, the text of the passage is presented as a mirror image to make it harder for the participant to recognize letters and words (See Appendix B). This simulates the difficulty students with dyslexia have labeling names and producing their corresponding speech sounds. To add further stress to the task, the station leader gathered the participants into a reading group circle where participants read in a "round robin" style, each taking turns reading one or two sentences while the station leader made “encouraging” comments such as “I know you can do this because we just practiced yesterday” and “You are doing a good job, but watch your fluency as you read.” The round robin style reading and the station leader’s comments added further pressure to an already challenging task.

Simulation - Station Five

Station 5 (Write or Left) simulated how difficult handwriting can be when letter formation is not automatic (sometimes called dysgraphia). Participants had to use their non-dominant hand to complete the task to simulate the frustration students with dyslexia may feel with handwriting tasks. Lack of automaticity with letter formation often frustrates students with dyslexia and interferes with their written expression. Participants engaged in various handwriting tasks,

including activities such as tracing, writing the alphabet, drawing shapes, etc. all at a fast moving pace (See Appendix C). In addition, the station leader added additional pressure, as per the simulation instructions, by peering over participants shoulders while they worked and making comments about their poor handwriting and/or slow speed.

Simulation - Station Six

Station 6 (*Hear and Spell*) was another listening task that simulated an auditory discrimination problem. The task simulated the difficulty students with dyslexia may have discriminating phonemes (the individual sounds within words). The challenge of this task was to correctly spell dictated words that were difficult to hear. An audio recording of a teacher dictating the list of spelling words was played for the participants, but the recording is purposely distorted, muffled, and/or indistinguishable at times. Similarly to the other stations, the station leader added additional pressure to the task by saying things such as "Be sure to do your best!" and "We will hang your spelling tests in the hallway."

Post-Survey

After each station was completed, the participants filled out a simple survey (see Appendix D) to share their reactions to the task they just completed. The first question on the survey asked participants to identify the main reaction they experienced when engaging in the task: *Fight, Flight, Freeze,* or *Other.* The participants were reminded by the station leader of the characteristics of the fight, flight, and freeze reactions just prior to their completion of the survey. If participants experienced more than one reaction or experienced a reaction other than fight, flight, or freeze, they were instructed to select the "other" category.

Further, participants were asked to reflect specifically on the impact of the experience of completing each task may have on their future teaching approaches. By first reflecting on their response to the task and then reflecting on what knowledge was gained from this, data from this question provided the impact the simulation had on their newly gained insight into teaching students with dyslexia.

Participants were also invited to leave comments about their experience with the task. Surveys were completed by participants six times (one at the completion of each station) (See Appendix D). This provided data on the reaction of the participants to the tasks individually. The participants were asked the following questions with options for responses:

1. Considering this task, which best describes your reaction to the task?

   FIGHT: I became frustrated, irritated, or angry.
   FLIGHT: I wanted to get up and leave the room.
   FREEZE: I was neither angry nor wanting to leave, but simply gave up on the task.
   OTHER: I did not experience fight, flight, or freeze, but something else.

2. Considering this task, which best describes your reaction/knowledge gained?

This task provided me with new and valuable knowledge/insight that will likely impact my future teaching.

This task provided me with new knowledge/insight, but it may not impact my future teaching.

This task either provided me with no new knowledge/insight or that knowledge/insight will not impact my future teaching.

The data from the surveys were disaggregated by station and response. A descriptive statistics data analysis approach was chosen due to the type of data collected by the survey responses. Data from Question 1 was sorted by response and calculated to provide a percentage breakdown of each of the three responses to each task. Data from Question 2 was collected for each response, but aggregated across all stations to provide an overall analysis of the impact of the entire simulation on participants' insight and the impact on their future teaching. A descriptive statistics data analysis approach was chosen due to the type of data collected by the survey responses. In addition, optional comments from participants were analyzed for themes based upon the word choice and tone of the comments. This provided an additional level of analysis of the participants' responses to the tasks.

Data Analysis and Findings

A total of 27 participants completed the six-station simulation. After each station, participants were asked to reflect on their reactions to the tasks and the impact the experience may have on their future teaching of students with dyslexia.

Station 1

The task in Station One (*Learn to Read*) asked each participant to associate symbols with speech sounds in order to read and comprehend a story without instruction on the sound/symbol association. Each participant took a turn reading aloud in "round robin" style reading in front of their peers while the station leader made comments to participants about their decoding/fluency skills (See Image 1).

Image 1

A total of 27 participants completed the post-survey at the conclusion of this task. Responses to this task (see Table 1) varied among participants, but 33% of participants experienced the "freeze" reaction to the task while 30% indicated a "fight" reaction to it. This indicates that most participants experienced a desire to give up or became angry/agitated during the task.

Table 1

Station One: Question 1 Responses

	n=28	Percent of Total Responses
Fight	8	29
Flight	6	21
Freeze	9	32
Other	5	18

Comments provided by participants (see Appendix E) further supported the "freeze" and "fight" reactions to the tasks. One participant noted the desire to "skip the words" (a "freeze" response) and two participants noted being frustrated by the task (a "fight" response). These comments, as well as others such as "It made me feel like I would NOT want to show up to school, and when I did, I would just want to throw up" indicate the level of difficulty experienced by participants during this task.

Station 2

The second station (*Listen to Me*) required participants to listen to an audio recording and discriminate between the important auditory information and the non-essential background noise while filling out a worksheet (See Image 2). The task simulated the difficulty students with dyslexia may experience when unable to tune out background noise, causing them to miss important information or directions.

Image 2

Data collected after the completion of this task (see Table 2) indicated that 48% of participants had a "fight" reaction to this task. Further, 26% of participants responded with an "other" reaction. Both the "fight" and "other" reactions to the task are demonstrated in the various comments provided by participants (see Appendix E), such as "it was super frustrating and upsetting" and "it hurts my heart" and "I wanted to copy off my neighbors' papers."

Table 2

Station Two: Question 1 Responses

	n=28	Percent of Total Responses
Fight	13	46
Flight	4	14
Freeze	4	14

Other	7	25

Station 3

The third station (*Write with Mirrors*) required participants to trace or form letters and numbers while looking at their writing hand in a mirror (See Image 3). This is very challenging since it interrupts the communication between the brain and hand. In addition, their peers working next to them and the station leader offering comments on their work placed added pressure on participants during this task.

Image 3

Participants completing this task offered two main responses to the experience: the "Other" reaction and the "Fight" reaction (see Table 3). Of the 25 participants of this station, 40% of participants noted their reactions were "Other" and 35% had the "Fight" reaction.

Comments indicated that participants who noted a response of "Other" found the task to be a challenge, but not necessarily frustrating (see Appendix E). Comments such as "This one was fun" and "I enjoyed the challenge" indicate that many participants did not have feelings of quitting or feelings of wanting to leave the room. Instead, they found this particular task a fun challenge. Others, however, did not find it to be an enjoyable challenge and noted that it was "very frustrating" and "HARD."

Table 3

Station Three: Question 1 Responses

	n=26	Percent of Total Responses
Fight	9	35
Flight	2	7
Freeze	4	15
Other	11	42

Station 4

The fourth station in the simulation (*Name That Letter*) required participants to quickly decode words in mirror image format while reading aloud in front of peers (with the station leader offering "feedback") while simultaneously comprehending the passage.

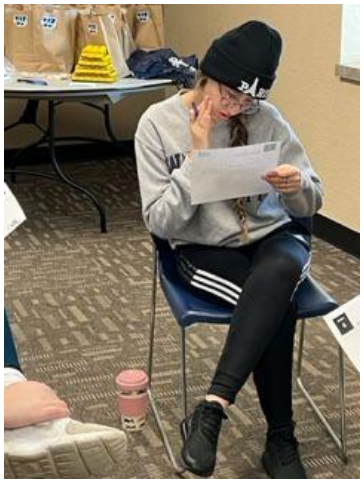


Image 4

The data indicates that 50% of participants responded with the "Fight" reaction to this task (see Table 4). While 25% of participants experienced the "Freeze" reaction and 15% experienced the "Flight" reaction, most participants found the task to cause anger and frustration. Participant comments noted that "the reading parts are particularly hard because of having to read in front of people" and "the encouragement and comments made it more frustrating" (see Appendix E).

Table 4

Station Four: Question 1 Responses

	n=27	Percent of Total Responses
Fight	14	52
Flight	4	14
Freeze	6	22
Other	3	11

Station 5

Participants of Station 5 (*Write or Left*) had to use their non-dominant hand to complete writing tasks, including activities such as tracing, writing the alphabet, drawing shapes, etc. all at a fast-moving pace (See Image 5). In addition, the station leader added additional pressure by peering over participants shoulders while they worked and making comments about their poor handwriting and/or slow speed (See Image 5).

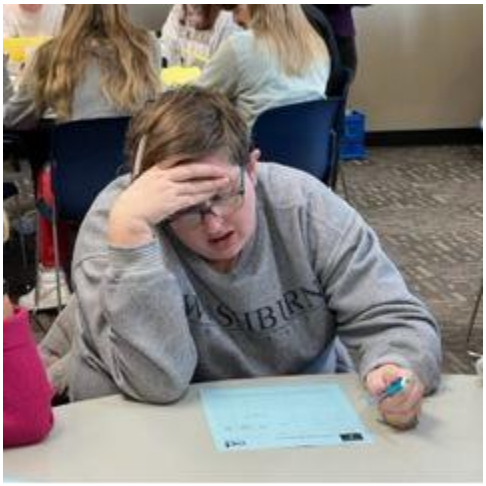


Image 5

Of the 22 participants of this station, 12 of them (55%) experienced the "Fight" reaction (see Table 5). The other 9 participants experienced "Other" reactions (5 participants) and the "Freeze" reactions (4 participants), making up 25% and 20%, respectively, of the other reactions noted. In this station, 0 participants indicated a "Flight" reaction. Participant comments indicate the "Fight" reaction: "this was frustrating" and "having teachers come by talking in my ear is harder" (see Appendix E).

Table 5

Station 5: Question 1 Responses

	n=21	Percent of Total Responses
Fight	12	57
Flight	0	0
Freeze	4	19
Other	5	24

Station 6

The final station (*Hear and Spell*) was another listening task that asked participants to correctly spell dictated words that were difficult to hear through a distorted, muffled, and/or indistinguishable audio recording (See Image 6). Like the other stations, the station leader added additional pressure to the task by offering intended words of encouragement to the participants.

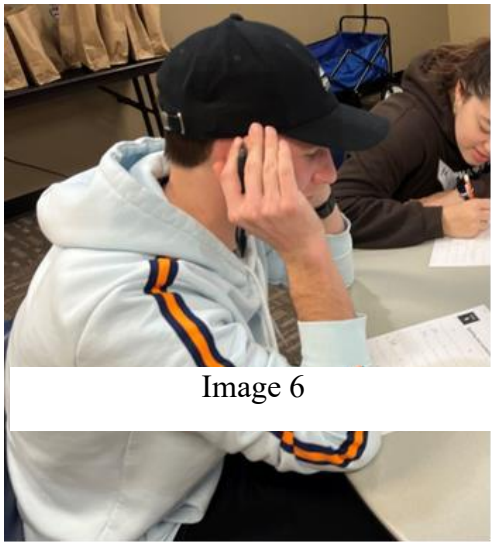


Image 6

After completing this station, 45% of the participants noted a "Fight" reaction and 30% noted a "Freeze reaction (see Table 6). Comments provided by the participants further demonstrate those reactions (see Appendix E). Comments such as "Very frustrating - could not decipher" and "overwhelmed - started to freeze" and "it just made me want to guess" show participants' viewpoints on the task.

Table 6

Station Six: Question 1 Responses

	n=26	Percent of Total Responses
Fight	12	46
Flight	1	4
Freeze	8	31
Other	5	19

New Insight/Impact on Teaching

At the conclusion of each station, participants were asked to reflect on the knowledge/insight learned through the completion of the task as well as if the experience would have an impact on their future teaching. Each of the 27 participants reflected on each of the six station tasks. Aggregated data across all tasks provides an overall look at the impact of the simulation as a whole (see Table 7).

Participants were asked to indicate if the tasks provided them with new insight that would likely impact their teaching of students with dyslexia, new insight that may not impact their teaching of students with dyslexia, or no new insight that will impact their future teaching of students with dyslexia. Across all six stations, 151 survey responses were received. Among those responses, a total 93% of responses indicated that new and valuable knowledge/insight was gained that will likely impact the participants' future teaching of students with dyslexia. In addition, 6% of responses indicated that new insight was gained but it may not impact the participants' teaching and less than 1% (only one response) indicated no new insight was gained (the participant indicated they have dyslexia so they did not learn anything new during this experience).

Table 7

Question 2 Responses

	n=151	Percentage of Total Responses
New and valuable knowledge/insight that will likely impact my future teaching.	141	93
New knowledge/insight, but it may not impact my future teaching.	9	5
No new knowledge/insight or that knowledge/insight will not impact my future teaching.	1	>1

Discussion

Research indicates that training on dyslexia should occur during teacher preparation programs so that teachers entering the field are equipped with the knowledge and skills to meet the needs of students with dyslexia (Mills & Clarke, 2017). To provide preservice teachers with as much knowledge of dyslexia as realistically possible, this includes both "textbook" knowledge of

characteristics, assessments, interventions, etc. as well as understanding and empathy through a glimpse into the learning experience of students with dyslexia. Further, the use of simulation has been shown to be an effective tool to engage and promote effective learning goals by providing opportunities for learners to actively experience different scenarios (Vlachopoulos & Makri, 2017). As a result, this study sought to engage preservice teachers with a dyslexia simulation to provide an understanding of dyslexia not able to be taught through traditional teaching methods.

Across all stations in the simulation, participants experienced a variety of fight, flight, freeze (or other) responses to these tasks. Each of these reactions strengthened the participants' understanding of the possible experiences of a student with dyslexia.

The reading tasks (Stations 1 and 4) provided an opportunity for preservice teachers to understand the difficulties students with dyslexia may have with sound-symbol associations, distinguishing similar letters. In addition, there was additional pressure placed on the performance of these tasks through the requirement of oral reading in front of peers and the station leader commenting on decoding, fluency, etc. The data from the responses to the Station 1 task indicates the two main responses of "freeze" and "fight." Similarly, the reactions to the reading task in Station 4 indicated the majority of participants reacted with "fight" or "freeze" responses. Comments by participants noted how difficult it was to read the texts which led to their frustration and feelings of anger. In addition, they noted how reading in front of peers caused great anxiety and negative feelings. These responses aren't surprising as the tasks contain both difficult aspects (trying to read words without understanding the symbol-sound relationship and with the words in mirror image) as well as anxiety-inducing aspects (the round-robin style reading aloud in front of peers). By participating in these stations, participants were able to gain a new insight into not only the cognitive difficulties that students with dyslexia may encounter when reading, but also how the classroom environment can make those difficulties even more profound.

The writing tasks (Stations 3 and 5) asked participants to write by only looking at a reflection of their hand and the paper and by using their non-dominant hand. In addition, there was pressure added by the station leader as they commented on participants' accurate writing and speed, as well as a comparison to their peers. There were mixed responses to Station 3 with both the "fight" reaction and "other" reactions as the most cited responses. The majority of participants of Station 5 noted a "fight" response to this task. Comments from both tasks indicate the frustration felt by their inability to perform basic writing tasks. Several participants noted that they were surprised at how difficult these basic tasks were when their brain and hand were not clearly communicating. Others noted that the added pressure by the station leader's "words of encouragement" increased their anxiety levels when performing the task. By participating in these tasks, participants became more aware of the difficulties with writing that students with dyslexia may face as their ability to effectively write down their thoughts or take notes is compromised. In addition, participants were able to experience the anxiety caused by the typical pace of a writing task as well as a well-meaning teacher offering encouragement and feedback. By experiencing these stations, participants became more aware of the challenges faced by students with dyslexia while writing as well as how the classroom environment may intensify those challenges.

The listening tasks (Stations 2 and 6) required participants to distinguish between important information and background noise as well as discriminate among phonemes while writing the information in addition to hearing it. Participants had the added pressure of additional noises and the station leader's comments on their performance on the tasks. In response to the listening task in Stations 2 and 6, participants mainly experienced the reaction of "fight." The frustration was visible on their faces during the tasks (see Image 7) as they were straining to listen and their comments noted feelings of being overwhelmed and exhausted with the tasks. By experiencing these tasks, participants gained insight into how difficult it may be for some students with dyslexia to distinguish sounds and comprehend oral language. Combining the listening difficulties with the typical classroom environment (additional noises, pressure to keep up with peers, feedback from teachers, etc.) provided participants with a greater level of understanding of how not only the tasks may prove difficult for the students, but that the surrounding environment may also exacerbate that difficulty.

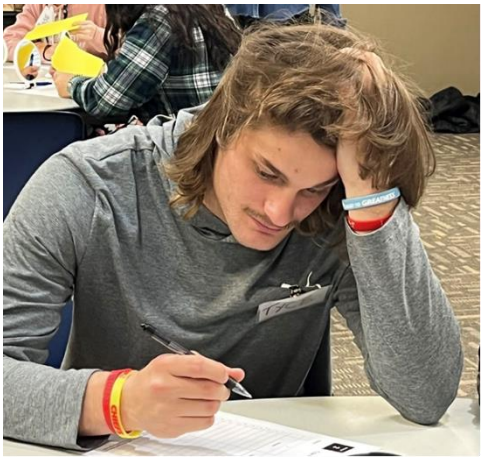


Image 7

Further, participants reflected on the simulation regarding new knowledge/insight learned through the completion of the tasks as well as if the experience would have an impact on their future teaching. An overwhelming number of participants (93%) indicated that this experience will impact their future teaching. This level of response indicates that the simulation successfully provided the preservice teachers with an experience that gave them new knowledge that will influence their approach to teaching students with dyslexia in their future classrooms.

Conclusion

In conclusion, because of the prevalence of students with dyslexia in classrooms around the country, teachers must have an understanding of dyslexia, including characteristics, assessments, and interventions, but also an understanding of how this brain-based processing disorder creates learning challenges and the reactions the students may display when faced with these difficulties. In addition, teachers need to be aware of how their typical classroom practices may cause even further disruptions and challenges to the student rather than supporting them in their learning.

The preservice teachers that participated in the *Experience Dyslexia* simulation gained new insight into not only the challenges faced by students with dyslexia regarding brain-based processing issues, but also how the classroom environment contributes to those difficulties. By completing the six stations and focusing on their personal reactions of fight, flight, or freeze, participants gained a deeper understanding of how they may see those similar types of responses in their students with dyslexia when faced with tasks that are challenging. Further, participants overwhelmingly indicated that experiencing this simulation will have an impact on their future teaching. The intent of the simulation is to ultimately provide students with dyslexia with a classroom environment that supports their learning through their teachers' understanding of dyslexia and its impact on learning. The data indicates that the implementation of this simulation

on this group of preservice teachers will have a positive impact on students with dyslexia in their future classrooms.

References

Andreu Andrés, M. A., & García Casas, M. (2011). Perceptions of gaming as experiential learning by engineering students. *International Journal of Engineering Education, 27*(4), 795–804.

Auman, C. (2011). Using simulation games to increase student and instructor engagement. *College Teaching, 59*(4), 154–161.

Barr, G. (2018). Persistence of common myths and misconceptions regarding dyslexia among preservice teacher populations. *WWU Honors Program Senior Projects*, 68.

Cant, R.P. & Cooper, S.J. (2017). Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review. *Nurse Education Today, 49*, 63-71.

Colson, J.M. (2013). Teacher training on teaching students with dyslexia. *Master's Theses and Capstone Projects,* 33.

Fedora, P. (2014). What all reading teachers should know and be able to do. *Kappa Delta Pi Record, 50*, 24-30.

Flink, D. (2014). Thinking differently: an inspiring guide for parents of children with disabilities. New York, NY: Harper Collins Publishing.

Frydman, J.S. & Mayor, C. (2017). Trauma and early adolescent development: Case examples from a trauma-informed public health middle school program, *Children & Schools, 39*(4), 238–247.

Gaab, N. (2017). It's a myth that young children cannot be screened for dyslexia. Baltimore, MD: International Dyslexia Association. Retrieved from http://dyslexiaida.org/its-a-myth-that-young-children-cannot-be-screened-for-dyslexia/

Hartley, J. E. K., & Henderson, M. (2018). Mental health promotion for young people - the case for yoga in schools. Education in the North, 25(3), 139–147.

Hott, B., Thomas, S., Henry, H., Masten, W., Hogan, L. & Jones, B. (2015). Defining dyslexia: Knowledge and perceptions of early childhood educators, *Journal of the Effective Schools Project*, *20*, 17-21.

International Dyslexia Association (2018). *Experience Dyslexia* Facilitator's Packet. Baltimore, MD: International Dyslexia Association.

International Dyslexia Association (2010). *Knowledge and practice standards for teachers of reading*. Baltimore, MD: International Dyslexia Association.

Kahn, P., & Vezzuto, L. (2017). Understanding and responding to adverse childhood experiences in the school setting. *Center for Healthy Kids and School*.

Kang, J., Lee, S., Park, E., & Leem, H. (2016). Event-related potential patterns reflect reversed hemispheric activity during visual attention processing in children with dyslexia: A preliminary study. *Clinical Psychopharmocology and Neuroscience, 14*(1), 33-42.

Lameras, P., Arnab, S., Dunwell, I., Stewart, C., Clarke, S., & Petridis, P. (2016). Essential features of serious games design in higher education: Linking learning attributes to game mechanics. *British Journal of Educational Technology*.

Levine, P. A. (2010). *Healing Trauma: A Pioneering Program for Restoring the Wisdom of Your Body*. www.ReadHowYouWant.com.

Li, M. C., & Tsai, C. C. (2013). Game-based learning in science education: A review of relevant research. *Journal of Science Education and Technology, 22*(6), 877–898.

Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). Defining dyslexia, comorbidity, & teachers' knowledge of language and reading. *Annals of Dyslexia, 53*, 1-14.

Lyon, G. R., & Weiser, B. (2009). Teacher knowledge, instructional expertise, and the development of reading proficiency. *Journal of Learning Disabilities, 42*(5), 475-480.

Moats, L. (2004). Relevance of neuroscience to effective education for students with reading and other learning disabilities. *Journal Of Child Neurology, 19*(10), 840-850.

Mills, J. R. (2018). Effective multi-sensory strategies for students with dyslexia. *Kappa Delta Pi Record, 54*(1), 36-40.

Mills, J. R. and Clarke, M. (2017). Dyslexia and the need for teacher training: A collaborative three-pronged approach between a university and a community partner. *Leadership and Research in Education, 4*(1), 77-89.

Ness, M. & Southall, G. (2010). Preservice teachers' knowledge of and beliefs about dyslexia. *Journal of Reading Education, 36*(1), 36-43.

Porges, S. W. (2011). *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation (Norton Series on Interpersonal Neurobiology)*. WW Norton & Company.

Puolakanaho, A., Ahonen, T., Aro, M., Eklund, K., Leppänen, P., Poikkeus, A., Tolvanen, A., Torppa, M., & Lyytinenet, H. (2007). Very early phonological and language skills: estimating individual risk of reading disability. *Journal of Child Psychology and Psychiatry, 48*(9), 923–931.

Rutten, N., van Joolingen, W. R., & van der Veen, J. T. (2012). The learning effects of computer simulations in science education. *Computers & Education, 58*(1), 136–153.

Shaywitz, S. E. (2005). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. New York, NY: Vintage Books.

Silvia, C. (2012). The impact of simulations on higher-level learning. *Journal of Public Affairs Education, 18*(2), 397–422.

Sitzmann, T. (2011). A meta-analytic examination of the instructional effectiveness of computer-based simulation games. *Personnel Psychology, 64*(2), 489–528.

Vlachopoulos, D., Makri, A. (2017) The effect of games and simulations on higher education: a systematic literature review. *International Journal of Education Technology in Higher Education, 14,* 22.

Wadlington, E. M., & Wadlington, P. L. (2005). What educators really believe about dyslexia. *Reading Improvement, 42*(1), 16-33.

Wanzek, J. & Vaughn, S. (2007). Research-based implications from extensive early reading interventions. *School Psychology Review, 36,* 541.

Warren, J. N., Luctkar-Flude, M., Godfrey, C., & Lukewich, J. (2016). A systematic review of the effectiveness of simulation-based education on satisfaction and learning outcomes in nurse practitioner programs. *Nurse Education Today, 46,* 99–108.

Washburn, E. K., Joshi, R. M., & Binks-Cantrell, E. (2011a). Are preservice teachers prepared to teach struggling readers? *Annals of Dyslexia, 61,* 21-43.

Washburn, E.K., Joshi, R., & Binks-Cantrell, E. (2011b). Teacher knowledge of basic language concepts and dyslexia. *Dyslexia, 17,* 165-183.

Washburn, E., Mulcahy, C., Joshi, R. M., & Binks-Cantrell, E. (2016). Teacher knowledge of dyslexia. *Perspectives on Language and Literacy, 42*(4), 9-14.

Washburn, E., Mulcahy, C., Musante, G., Joshi, R. M. (2017). Novice teachers' knowledge of reading-related disabilities and dyslexia. *Learning Disabilities: A Contemporary Journal, 15*(2), 169-191.

Appendix A

Station One Sample Passage

⊣∪⊕+⅂⊔ (Wizard) ⊗∨⩓⊗⊥ (Elves) ⊓⇌⇌⊐⊥ (Books)

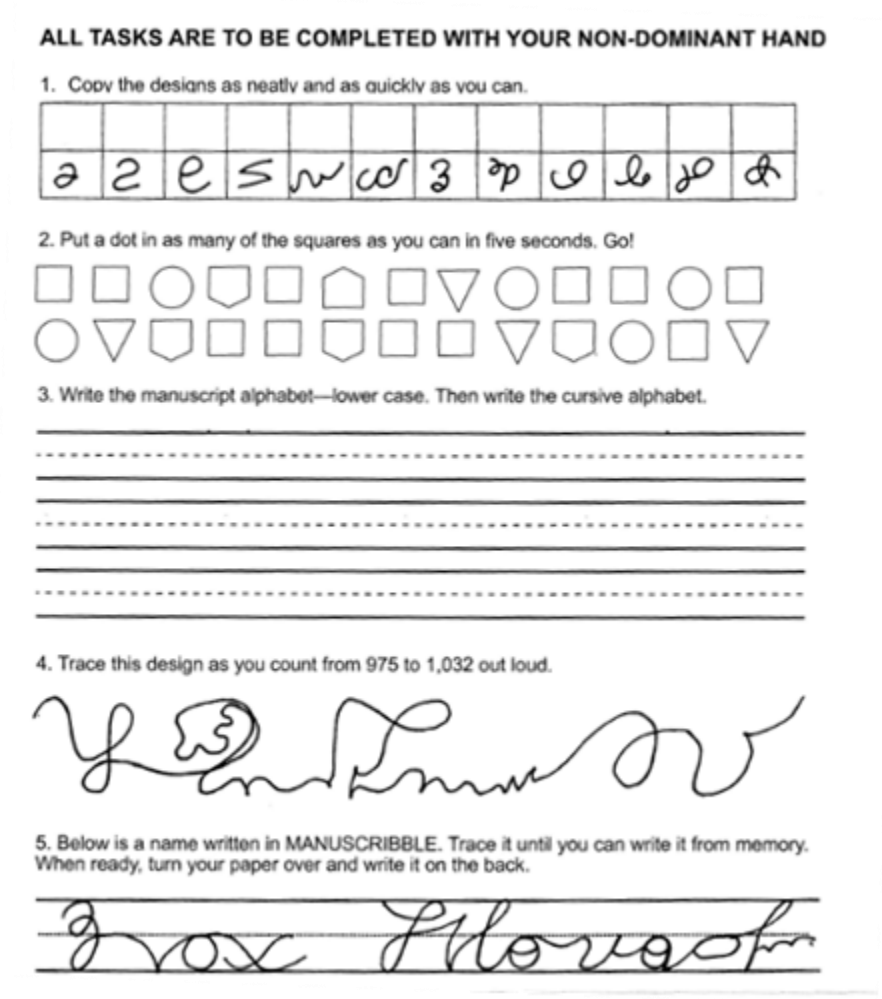
Appendix B

Station Four Sample Passage

A Little Story

Appendix C

Station Five Worksheet



ALL TASKS ARE TO BE COMPLETED WITH YOUR NON-DOMINANT HAND

1. Copy the designs as neatly and as quickly as you can.

2. Put a dot in as many of the squares as you can in five seconds. Go!

3. Write the manuscript alphabet—lower case. Then write the cursive alphabet.

4. Trace this design as you count from 975 to 1,032 out loud.

5. Below is a name written in MANUSCRIBBLE. Trace it until you can write it from memory. When ready, turn your paper over and write it on the back.

Appendix D

Participant Survey

1. Considering this task, which best describes your reaction to the task?

FIGHT: I became frustrated, irritated, or angry.	FLIGHT: I wanted to get up and leave the room.	FREEZE: I was neither angry nor wanting to leave, but simply gave up on the task.	OTHER: I did not experience fight, flight, or freeze, but something else.

2. Considering this task, which best describes your reaction/knowledge gained?

This task provided me with new and valuable knowledge/insight that will likely impact my future teaching.	This task provided me with new knowledge/insight, but it may not impact my future teaching.	This task either provided me with no new knowledge/insight *or* that knowledge/insight will not impact my future teaching.

COMMENTS: (Optional, but appreciated!)

Appendix E

Participants Comments

Station One: Sample Comments

	Comments
Fight, Flight, Freeze Responses	The teacher told me I was doing a good job but I felt frustrated. It reminded me of how I felt when I had a visual disorder. This would be so frustrating to learn this way. It made me feel like I would NOT want to show up to school, and when I did I would just want to throw up. Very insightful. It was impossible, is this something that students see? This is better than a normal class. I already didn't like popcorn reading, but after this I will never use it in the classroom. Just made me want to skip the words that didn't make sense to me. Using "code words" for actual words was a lot like learning a new language because you had to remember what each code meant. This experience reminded me of learning Spanish.

Station Two: Sample Comments

	Comments
Fight, Flight, Freeze Responses	It was incredibly difficult to discern words at all. It was super frustrating and upsetting. I would have a really hard time showing up to school . It hurts my heart that this is a reality for some people. I wanted to copy off my neighbors' papers. I was frustrated and wanted to quit. This station was difficult on its own , but in combination with the writing stations it would be horrible. This station was difficult, but I'm used to filtering out other sounds and multitasking, so while it was exhausting, it was semi-normal. It was insightful. I was just trying to listen and focus. It reminded me of being in a crowded room where I have to "zone out" different voices to focus. Tried to focus on only one voice.

Station Three: Sample Comments

	Comments
Fight, Flight, Freeze Responses	Numbers were extremely hard.
	I found that while tracing straight lines it was hard, but double tracing curved lines was nearly impossible.
	It was so strange to feel so out of control and unable to do it.
	Very frustrating.
	Star was fun and interesting it was difficult with small vs large mirror.
	Didn't know that placement of pencil would affect me so much.
	wrote next to 1: started on 'frustrated', wrote under 3: froze. didn't want to quit)
	It was interesting to see how difficult these task were, even being simple tasks.
	Numbers task was easiest.
	I liked the numbers & letters & found them easier to do than the star.
	I was annoyed, but saw it as a "challenge" to figure out how to make writing better.

Station Four: Sample Comments

	Comments
Fight, Flight, Freeze Responses	Wanted more time to read it.
	The encouragement and comments made it more frustrating.
	I got frustrated and gave up on some words.
	Very frustrating
	Amazing how the letters were unrecognizable
	The reading parts are particularly hard because of having to read in front of people.
	This was difficult and frustrating
	If I were a student with dyslexia I would have a super difficult time even trying to comprehend it because I would be too anxious.
	The reading parts are particularly hard because of having to read in front of people.
	I got frustrated and gave up on some words.
	Smaller words were easier to understand.
	No reading out loud.
	Not terrible but tried to make the most sense of it all.
	Felt like I could do it with time.

Station Five: Sample Comments

	Comments
Fight, Flight, Freeze Responses	This was frustrating because of a lack of time. Struggled remembering cursive due to age and lack of training in school. Frustrated My hand hurts. Loved everything felt competitive the whole time for all stations. Having teachers come by talking in my ear is harder I felt like drawing, but not like writing words which would easily become frustrating.

Station Six: Sample Comments

	Comments
Fight, Flight, Freeze Responses	The comments weren't helping. They made it harder to hear. I think a helpful accommodation might be testing in separate room. This was helpful to know how some students struggle. Very frustrating- could not decipher. Overwhelmed - started to freeze It just made me want to guess/not take it seriously. The talking of the instructor was what hurt me the most in this activity. Reminded me to speak clearly as a teacher. I wanted the speaker to speak up. I felt the need to work harder.