

[00:00:06.290] - Lauren

Welcome to the LDA Podcast, a series by the Learning Disabilities Association of America. Our podcast is dedicated to exploring topics of interest to educators, individuals with learning disabilities, parents, and professionals to work towards our goal of creating a more equitable world.

[00:00:23.670] - Lauren

I'm here today with Dr. Nancy Cushen White. She is a clinical professor at UCSF. She's a certified instructor of the Slingerland Multisensory (Multimodal) Structured Language Approach, and she's here today to talk to us about handwriting and dysgraphia. So thank you for being here, Nancy.

[00:00:38.370] - Dr. Nancy Cushen White

Thank you for inviting me.

[00:00:40.000] - Lauren

So to start off, could you explain dysgraphia and how it affects handwriting?

[00:00:43.870] - Dr. Nancy Cushen White

Okay, well, first of all, handwriting is partly a motor skill, but it's more than that. So letter forms are stored and processed in working memory, and it's the same letters that would be processed for reading and spelling, but they also play a role in handwriting. So the orthographic loop. Think of it as the mind's eye where letters and graphemes are stored and processed in working memory in connection with the sequential hand movements performing the letters, the movement of hands and the fingers. Dysgraphia is impaired handwriting, and that can interfere with written spelling, but it can also interfere with the speed of writing as well as the legibility. And dysgraphia may occur alone, with dyslexia, with an oral language difficulty, or with both. Dysgraphia, in addition to the impaired handwriting part, the part that deals with spelling is orthographic coding, and orthographic coding involves that same working memory we talked about for the same letters that are going to be involved in reading and spelling. But in addition to that, when they're in working memory, we can manipulate them. So it's like that mind's eye you're seeing them can move things around in the short term, and then eventually that develops a permanent memory for those words so that you can access them.

[00:02:19.810] - Dr. Nancy Cushen White

But it's not just the visual image of them, it's in combination or connection or integration with their pronunciation and means. And then, of course, when the handwriting comes in, there's the sequential movements for forming each of the letters. So when we're talking about dysgraphia, we're talking about the motor skills. But people with dysgraphia may have problems with one or both. They may have trouble

with the orthographic coding for spelling or with the planning, the sequential finger movements for writing or both.

[00:02:53.580] - Lauren

That's good to know. So there's two parts. So could you talk a little bit more about the studies that support integrated handwriting instruction in K through Twelve?

[00:03:01.900] - Dr. Nancy Cushen White

In 2016, Wolf, Abbott, and Berninger did a study on classroom instruction. There were two studies. The first study looked at first graders, and they taught manuscript handwriting letters, and that manuscript instruction was embedded within a multimodal approach for teaching spelling, reading and composing and composition. And the comparison group was just a business as usual. They also got manuscript handwriting instructions, but it was not systematically related to the other literacy activities. Both groups improved on automatic alphabet writing. The treatment group, however, improved significantly more than the control group by from the second to the 9th month of first grade. The treatment measures were dictated spelling, so they were writing spelling words and recognition for reading of word specific spellings among phonological foils. And then study two looked at those same first graders that received the systematic instruction along with the manuscript and gave them a second year of instruction still embedded within them, multimodal structured language lessons. And then there was another group who got cursive. So they had a year of manuscript, a year of cursive not embedded within. And the first group had two years. And the kids, not surprisingly, I suppose people who teach them, results are discussed in Mastering the Handwriting Format before introducing another format.

[00:04:59.810] - Dr. Nancy Cushen White

So those kids who had a year to learn it and then a year to practice it became much more automatic and they were able to use it functionally at higher levels than the students who only had one year of each. And these were not necessarily kids diagnosed with a learning disability. These were regular classroom, just beginning 1st 2nd graders.

[00:05:21.190] - Lauren

Well, and that already sort of answers my second question here. It's a digital age now. There's a lot more on computers and typing. So why is handwriting still important?

[00:05:33.350] - Dr. Nancy Cushen White

The orthographic loop involved that the sequential finger and hand movements for writing keyboarding does not. So, for example, there's a study on students taking notes, and the question was will the

students taking notes on the computer do better than the students taking written notes? And certainly from a personal point of view, when I heard that question, I thought I can type every word I hear, but I don't have to be paying attention to do it. I might have to go back and then rethink the whole thing. But if I'm writing, I know I don't have time to write every word. I actually have to think about what I'm hearing and decide what's most important. So not only did they do better right after the note taking exercise when they were asked questions, but they did better later and in applying the information. So in short, keyboarding is passive, is a much more passive exercise. And what you're doing with your fingers, it's in a different place, but you're doing the same movement with handwriting formation of each letter has a unique sequence of movements, and if it's taught in a way that associates the name of the letter with what the letter looks like and that specific unique sequence of movements for forming each one, then that carries over to reading and spelling in ways that keyboarding cannot. Now I'm not going to throw away my computer.

[00:07:14.990] - Dr. Nancy Cushen White

There are still things that I will always do in that way. But I do recognize that a more recent study by Wiley and Rapp, it was the Arabic language, but it was a study on the effects of handwriting experience studying the modality effects typing, visual presentation, and writing. So with growing use of the Internet, cell phones, tablets, the question was how much time and resources should be spent on teaching handwriting, which is essentially what your question was. So Wiley and Rapp conducted the training study 42 adults and compared the benefits of typing, visual presentation, handwriting. And basically, the big idea was that handwriting is a productive use of learning time. Handwriting practice, not the typing or visual tasks, resulted in a much better performance on reading and spelling tasks that were not specifically taught. So the implications are that a subject assigned to the handwriting practice group use their knowledge of how to write to reinforce their spelling and reading of words. So the benefits of time spent practicing handwriting go far past just handwriting to letter recognition, word reading, spelling, categorizing, and memory.

[00:08:41.510] - Lauren

This isn't just for students with dysgraphia. This is also all students.

[00:08:45.070] - Dr. Nancy Cushen White

Right. The other thing about writing, once it's written, you can look at it, you can analyze it, you can do something, and you can do that if you typed it also. But the question is, the cognitive strength that goes into the actual writing seems to be connecting with deeper processing than just typing.

[00:09:09.350] - Lauren

So how is handwriting useful? You touched on this as well, but throughout a child's development, is it useful beyond just when you're originally learning handwriting?

[00:09:18.890] - Dr. Nancy Cushen White

Well, Interestingly. I'm going to start at the top and then. Yeah, go to the bottom. But with teachers taking our training courses, there are teachers who feel for their lesson plans. They may have a template they can fill in, they may have something where they can type the lesson plan. But many of them feel that if they write it, actually write it, they learn it better, they understand it better, they think it through, and they catch mistakes or glitches that they might not catch if they're doing it in those other ways. That's not certainly true for everyone. But if children learn handwriting is not functional unless it's automatic. But nor is keyboarding really in terms of the automaticity and being able to use it functionally. So if students are not taught a way to make each letter and they make the letter a different way every time, then they're not learning a sequence of movements that connects with the name of that letter and what the letter looks like. I'm not saying there's only one way to form letters. There are many correct ways to form most letters. But learning one way is the only way to get to automaticity.

[00:10:32.580] - Lauren

Right.

[00:10:33.830] - Dr. Nancy Cushen White

So starting off that way and in that study with Wolf, Abbot, and Berninger, in that classroom study, those children had a year to learn it. Every day they learned a few letters, they learned to read and write words with those letters. They continued practicing those letters, learned a few more. But every day, the handwriting instruction was integrated into the lesson from skills, learning something new to functional use of those skills. And as the year went on and they learned more and were able to do more, then the levels of functional use increased. Then they had a whole another year in second grade to automatize and use the skills more so that then they were automatic. Many times cursive is taught, the letters are taught. Sometimes they don't even teach the connections of the cursive letters. And then, well, you now know cursive if they aren't required to use it, they're not going to practice it enough for it to become automatic, right. Unfortunately, for better or for worse, there's no substitute for practice. But you need to practice what you want to remember, which is why learning a an efficient sequence of movements for each letter that's unique to that letter is so important.

[00:11:57.830] - Lauren

So we've talked a lot about handwriting instruction, and it's important. Would you be able to tell us a little bit about what would the ideal handwriting instruction look like in a classroom?

[00:12:07.340] - Dr. Nancy Cushen White

The best approach? Well, the approach that was used in that study, the approach that I've used most extensively is the Slingerland approach. But what's important about it is that you're teaching reading, writing, spelling, handwriting, and even oral language, all in an integrated way. So every lesson includes aspects of all of those because reading doesn't occur in one spot in your brain. It's a reading network, and the integration is the part that doesn't always happen if there's a glitch or a weakness anywhere along the way. So teaching the letters for writing first that you're going to use in spelling and in reading, just a few. So they're getting lots of practice with that. Then more letters are added, more complexities in the words are added, the morphology comes into play. You're teaching suffixes and prefixes to add to bases. You're making kids aware of those meaningful units. You're also emphasizing in spelling and in reading, not just the letter or saying what do you hear? But what is your mouth doing? So if they're trying to spell splash and they spell splash, then your word is splash. Say splash. Now say splash. Was that the same word?

[00:13:32.840] - Dr. Nancy Cushen White

No. So you've already spelled the first two sound. So if we're using letters on a chart that can see that if not, say the first two sounds in the words, what's the next thing your mouth does instead of just what do you hear? What is the mouth next thing your mouth does? If they again say splash, that would be splash. Your word is splashed. Let's say it slowly. Say SP, as you already did SP. What's the next thing your mouth does when you're saying that word and try to get them to stop. And when they feel that, oh, and they've already learned L how to write it, they've learned a key word for L, and they learn the sound L. So then they've got it. They move on. That's just emphasizing in both reading and for spelling, there's a motor aspect. So in that orthographic loop for learning the patterns or in that working memory piece where you're seeing the parts of the words that you're working with, there's also the motor aspect of the sequence of words performing them, and that's connected to the memory. Sometimes it's the kinesthetic memory that helps bring back the letter that you're looking for in the retrieval process, whereas with the phonological loop, the motor aspect is connected to speech.

[00:14:57.530] - Dr. Nancy Cushen White

So it's not just what does the letter look like? What do you hear? Those are speech sounds are not just sounds, and that's really important as part of that. But the units are getting larger and larger. So then those words with additional morphemes added are put into phrases, the phrases into sentences. And then you're working toward dictation of paragraphs. And when you're reading, you start again. You start with the symbol sound or the graphing phoneme. Then you're decoding words, but everything you're doing think of decoding and encoding as like addition and subtraction two sides of the same coin. Certainly spelling gets more complicated when there are multiple spellings, but there's still a connection there. So we talked about the student who has dysgraphia who may have difficulty with having impaired handwriting. And then we also said that it could be spelling, it could be the sequential movements of handwriting itself, or it could be a combination of both. And this is an example of a student that had both

difficulty with the letter formation and most certainly and very extremely with the spelling. He was in fifth grade. He was eleven years old. So he was in the fifth grade for the second time actually.

[00:16:24.830] - Dr. Nancy Cushen White

And when he was being tested, he was not being tested because anybody thought he was particularly bright, but because they felt he was a slow learner kind of across the board. And the psychologist said he was assessing him asked him one of the verbal absurdities questions, what's wrong with the sun shining at midnight? He threw back his head and he said, I need more information. What part of the world is it? He was actually ended up in a pilot special day class for students who were intellectually gifted with dyslexia. And he certainly fit the bill. But as you can see here, he had a standard score of 58 for word reading, a standard score of 57 for spelling. This is a kid who tests out as intellectually gifted when reading and writing were not required. So he had difficulty with both the handwriting hand. And then five months later, this is what he was able to do. Now he still has a lot of words misspelled, but he's improved. This is showing the words that he missed, in case they couldn't tell. But his standard score has gone from 58 to 68 in five months.

[00:17:43.240] - Speaker 2

He has a long way to go, obviously, but you can tell the qualitative differences in the spelling is that he knows now that every single syllable has to have a vowel sound, and he has represented a vowel sound in every single one of them. So whereas on the first one you couldn't even tell what the words were supposed to be, now you can pretty much figure out what most of them are. And his spelling went up to the centers for 64, but still, I mean, that's hugely below average, not to mention how much of a discrepancy between what he's able to do intellectually and he hasn't learned yet, but he was on his way. And then this is a student who had even more difficulty with motor skills, even for non language tasks, even for just drawing the figures. And his spelling had a standard score of 63 and a spelling standard score of 62. But you can see from the errors that he made, he has the visually similar letters like B, D has those issues. He has CK at the beginning of words. So obviously his orthographic memory is questionable because CK never comes at the beginning of a word in English.

[00:18:59.210] - Dr. Nancy Cushen White

But you see how in both cases they were giving everything they had to this task, and every one of them did their best to the very end. We stopped at the same point, but they didn't know it at all. They put a line to show it what they were told to do. If they had any idea what any of the letters could be spelled, they put what those were. And this was that same student five months later. So he still didn't finish the marks. We didn't teach him to make the marks, but he did teach him to write in cursive, so he was using that. And again, there's still errors, but the quality of those errors are far different. And his standard score went from 63 to 104 in reading in five months, and from 62 to 88 in spelling. This shows a 9th grader. This was actually in Dubai. It was a four week summer school, three and a half hours of instruction a day, and this

was his attempt to write single words on the first day. This does not look like a 9th graders handwriting. It wasn't manuscript, but you see, letter size relationships are off, the alignment is questionable, and there's a lot of emphasis was going to be put on morphology.

[00:20:20.950] - Dr. Nancy Cushen White

And he did not have a sense of the spelling of the bases or the prefixes, some more prefixes and suffixes than bases. But still and this was one month later where he spelled words that were of similar complexity, not exactly the same words. He still had some confusion between the base sci, which means to know know, as in science or conscious, and a base cise to cut. He still had some of that confusion there, but you can see him really working through using both the phonology and the morphology to spell. This shows that even in those lessons that you're teaching, not testing, you start with practicing those cursive letter connections that they're going to need when they write words here. So you're trying to prevent any errors or confusions that might occur, then practicing the phoneme grapheme encoding, spelling. Here's an example of a lesson where we practice the connections that he was going to need in that lesson, and then we did some morphological awareness practice. Right. The main spelling of the prefix that means with her together, the Latin prefix that means with her together. Right. The base element that means to trust.

[00:21:47.430] - Dr. Nancy Cushen White

These were all things he was going to need later on in the lesson, and you see how that develops then into words and phrases. So always working from skills to functional use. And these are young adults in a pretrial diversion program for San Francisco Mentor Court. These were all students who had gotten themselves into difficult trouble, and they were given a chance of either jail time or literacy class. I don't know if they decided they made the right choice, but the thing that was daunting to me was that it was only once a week for 2 hours, and I knew that they could learn it, but I just didn't know if 2 hours a week was going to be enough to get them to move fast enough that they were going to be able to feel the progress. So they started off with zero third percentile, 55 standard score, 20 years old for spelling and a year later, but only 2 hours a week instruction, there was a lot of improvement. So the standard score was 80 for spelling, the percentile a whole number, 9th percentile. He still has mistakes, but the confidence even in the writing he's using cursive.

[00:23:18.090] - Dr. Nancy Cushen White

He's using a lot of the things that he learned, and it shows me all of so many things he hasn't learned yet that he still needed to learn. But motivation was never an issue there, and it wasn't just because of the consequence.

[00:23:30.420] - Lauren

If they didn't, what are some small changes, if needed, that general education teachers can make to help students to reap the benefits of handwriting?

[00:23:38.710] - Dr. Nancy Cushen White

I think the most important piece is that all of us have to understand that handwriting is only functional if it's automatic, because in so many studies that we didn't talk about, the idea is if you're having to put energy in, how am I going to make this letter? You can't think even if you had an idea of what you wanted to say, you have to then focus on how do I make each letter? How do I spell? How do I organize it on all the things the handwriting can take care of, the organization, the spatial, and that sequence of movements, and then there aren't so many things to keep in working memory. So just teaching the letters, even teaching all of the letters without practice, with a few at a time for most kids isn't going to work. It's not going to get them where. And even kids whose cursive might be more legible at the beginning, it's still going to be slower because they're learning it. That was the reason, the importance of having those two years of instruction, two years of manuscript, and then two years of cursive that wasn't done in the study, but that's what it would suggest.

[00:25:01.590] - Dr. Nancy Cushen White

And so they go back to manuscript because it's faster, even though it's less. So practice makes permanent. I think that means what I'm saying is that's not a little change, because it means every day in a day that already has so many demands on teachers time. But that time is so well spent because it can make such a huge improvement. But just teaching the writing without integrating it with why you use writing, that doesn't get the kids where they need to be. They don't assume it's like teaching kids to decode and then they read a passage and they don't use anything that you taught them because you didn't teach them. The purpose, I'm sure the teachers are saying, are assuming that you're learning to do this. So when you reconnected text, you're going to be able to decode words, but you have to guide them into that and give them that practice. So can writing isn't a thing that you do over here. And remember the literacy networks, both for written language and for, well, the language networks, the oral language networks, the written language networks are all connected even when you're looking at the phonological loop, which is storing and working memory, verbal information.

[00:26:35.230] - Dr. Nancy Cushen White

But the memory part that's the strongest is often the articulation piece, which is motor. And with the orthographic loop, it goes to the motor for handwriting.

[00:26:47.590] - Lauren

Nothing exists in a bubble.

[00:26:49.250] - Dr. Nancy Cushen White

Unfortunately, right or not, it's fortunate once you get all the pieces there to connect. But it takes time, definitely, and it can't be done piecemeal, there always has to be the connections. So a comprehensive program, including all the language art skills, reinforcing each other and time to practice those skills. You can't take shortcuts, but in the end it takes less time, but you just don't know that until you get there. Very wise. Teacher Bets Lynn once said speed is not the road to success. Careful practice is the road to speed. And I think that's such an important thing to remember is if we try to get the kids to go faster than they can go functionally, meaning correctly, then it slows them down because they're practicing mistakes they know. We call it ideal speed or optimum speed, which is as fast as you can do what you're doing correctly and benefit from it. Say, if you read faster than you can comprehend, what's the point?

[00:28:06.270] - Lauren

Right.

[00:28:07.330] - Dr. Nancy Cushen White

Same thing with writing. If you're going so fast that you don't feel that sequence of movements and you don't have control of your pencil, then you're not learning something that you can use and you also don't want to go so slowly that you're not getting the full sequence of movements for the whole letter. Because there are a number of studies that show that teaching students the actual sequence of movements, talking about it, making it real to them, not just feeling it, but also being able to put words to it, helps them to connect in the studies that look at teaching letters to children, teaching them to write the letters at the beginning connects to reading. So once you've learned to write a letter, when you look at a letter even though you're not writing it, the part of your brain that has to do with the formation of that letter is activated at the same time you're looking at it and vice versa.

[00:29:06.690] - Lauren

Well, this is a great conversation. Thank you so much for sitting down and talking to me about it.

[00:29:11.600] - Dr. Nancy Cushen White

Thank you so much for inviting me to talk to you and thank you for your thoughtful questions.

[00:29:23.210] - Lauren

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