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Chapter 08: Designing with Disabilities in Mind

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**Instructional Message Design:
Theory, Research, and Practice
(Volume 2)**

Chapter 8: Designing with Disabilities in Mind

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8. Designing with Disabilities in Mind

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Key Points:

- Keep it simple!
- Use universal design strategies that work for all audiences
- Have one theme, chunk long information, and use visuals to support
- When presenting designs make sure there is a way to take notes

Key Words:

Individualized Educational Program (IEP), Universal Design for Learning (UDL), Autism Spectrum Disorder (ASD), Specific Learning Disability (SLD), Attention Deficit/Hyperactivity Disorder (ADHD)

Abstract

Instructional message designs are everywhere, and not everyone that interacts with the messages do so with ease. We need to begin thinking about those with disabilities while we are creating our designs to make understanding the importance of each message easier for everyone. Some strategies that can be used are: chunking information, using one main theme, and visual supports. This chapter focuses on a few common disabilities that can easily be

accommodated: Autism Spectrum Disorder, Specific Learning Disabilities, and Attention Deficit/Hyperactivity Disorder.

Introduction

Instructional Message Design is defined as “how various media and delivery systems might be used more effectively to help optimize instructional communications within context-specific instructional situations and learner needs” (Bishop, 2014). It is important for instructional designers and teachers to customize instructional message designs for all learners that will come in contact with their messages, including learners with disabilities. There are millions of learners that have been formally diagnosed and if we do not start creating instructional designs with disabilities in mind our profession will quickly be dismissed for something new. The best advice for educators and instructional designers to keep those with special needs in mind is to always think about their disabilities when designing and to keep it simple. This chapter will focus on instructional design strategies for common learning disabilities with a focus specifically on Specific Learning Disabilities, Attention Deficit Hyperactivity Disorder, and Autism Spectrum Disorder. While these disabilities by no means cover all that can be diagnosed it is a great start to the conversation to make our instructional message designs accessible to everyone.

Background

Messages are all around us on billboards, television ads, street signs, milk cartons, textbooks, etc. The list goes on and on and not every person that sees these messages can understand them easily. While we all have a bad day where focusing on these messages is difficult, those with disabilities often, if not always, struggle comprehending and retaining information from the thousands of messages we see everyday. Students in pre-kindergarten through 12th grade can be formally diagnosed with a disability and given an Individualized Education Program (IEP). The IEP follows them through primary education to assist the student in conquering the areas they have a deficit in due to their specific disabilities (see Sec.

300.320 definition of individualized education program, US Department of Education, 2017).

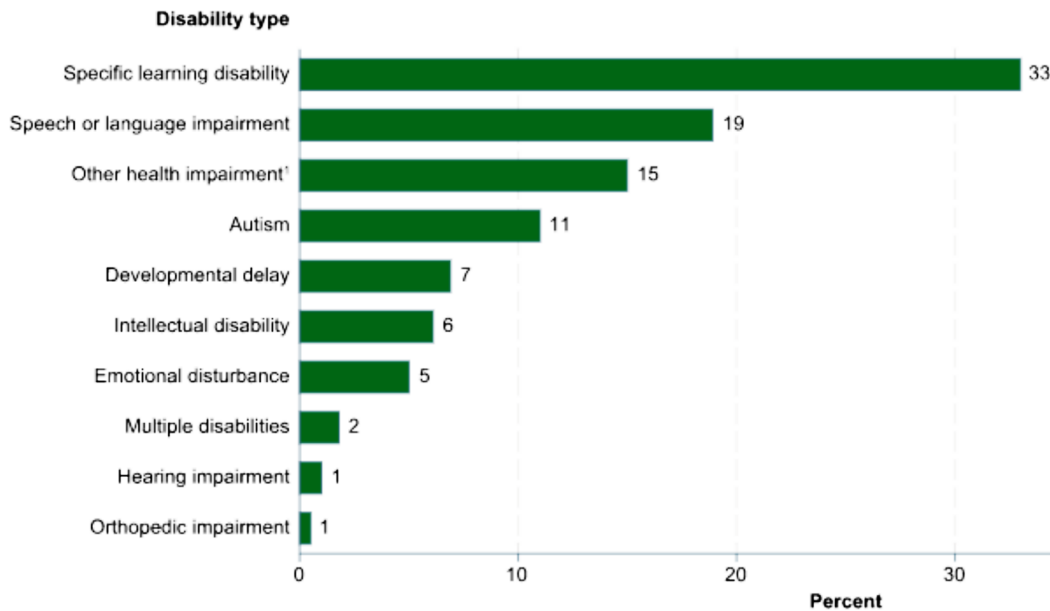
An IEP organizes information about the student's demographics, the conferences they had with teachers and families, the present level of performance, annual short and long term goals, the related services the child needs, transitioning goals from different school levels, and formally acknowledges the diagnosis of the child. This ever changing document shows how a "child's disability affects the child's involvement and progress in the general education curriculum [through] a statement of measurable annual goals, including academic and functional" (Sec. 300.320 definition of individualized education program). In 2015 anywhere from 15-25% of all students were diagnosed with a disability during their K-12 education that year. In 2017 these numbers were recorded as 1 in 5 (Horowitz et al., 2017). The number of diagnoses stayed consistent and even dropped slightly through the years to land near 14% in 2020. In total there are 7.3 million students in the 2019- 2020 school year that were diagnosed at some point previously in their k-12 public education, plus more students with disabilities are enrolled in private education (National Center for Education Statistics, 2021). If a quarter of the student body requires specific strategies to help them excel then it is in the best interest of all students that we use these instructional strategies all the time.

According to Christy G. Keeler when the IEP is not being followed to the highest level is when student failure begins (Keeler & Horney, 2007). So we as message designers and teachers need to make sure that we are following the IEP. We need to make sure that the strategies and supports on an IEP, like chunking, audio/visual supports, and note taking, are used in all designs to ensure that the IEP is followed no matter the situation. What instructional design supports can be used to ensure that all needs are being met, even those not formally diagnosed? It is best practice to use techniques to make learning and comprehension easier for all students, so then it is also best practice to continue using these strategies when designing messages for everyone that has a bad day and for all of these students with disabilities that grew up.

To best understand the strategies used by special education teachers you first need to understand the disabilities that the strategies are designed for. Some of the most common disabilities that affect

students ability to read and comprehend messages are Specific Learning Disabilities (SLD), Attention Deficit Hyperactivity Disorder (ADHD), and Autism Spectrum Disorder (ASD) (Sec. 300.320 definition of individualized education program, 2017). Refer to the figure below for how many students are in each category. Each person has their own unique qualities of the disability, but there are general characteristics that are seen across the board.

Figure 1
Different Types of Diagnosed Disabilities



Note. This figure showcases different types of diagnosed disabilities and how many students were diagnosed with each disability for the 2019-2020 school year across the United States. ADHD can be categorized under Other Health Impairments as ‘alertness due to chronic or acute health problems’. (Sec. 300.320 definition of individualized education program, 2017). Modified from <https://nces.ed.gov/programs/coe/indicator/cgg>.

Common Learning Disabilities to Accommodate For

Specific Learning Disabilities have been defined as a “disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations” (Life Development Center, 2021). A very wide scope of individuals struggle with comprehending instructional messages due to the diagnosis in one of the Specific Learning Disability (SLD) categories.

The Virginia Department of Education recommends that instructional messages be modified to meet the learning level needs of the individual when possible. If you are creating an instructional message design on a large scale it is recommended that you review the prerequisite skills or knowledge before starting new information (Virginia Department of Education, 2021). For example, if you are designing an advertisement for a new price on a car you would want to state the make, model, and year of the vehicle along with the old price before stating the new price.

Another strategy that works well with those diagnosed with Specific Learning Disabilities is to allow plenty of time before asking the audience to respond to prompts and when the situation lends itself, provide preferential seating toward the front or side of the room (Virginia Department of Education, 2021). Those with SLD can use preferential seating in a variety of ways. Sitting in the front row eliminates distractions of the rest of the audience moving so they can focus on the presentation. Sitting on the end of a row allows them to easily exit the room when they need to refocus. It also is easier for the presenter to see their hands raised if they have questions if they are not in the middle of the crowd.

According to educational psychologists, using precise language also helps all with disabilities but is especially helpful for those with Specific Learning Disabilities. Using less text and having your instructional message straight and to the point helps them focus on the task and understand the information presented. This means to “omit vague terms - such as perhaps, and so on, maybe, and usually- from

explanations and responses” (Eggen & Kauchak, 2016). Richard Mayer created a theory around this idea called the Coherence Principle stating that when extraneous material is excluded people will learn easier. Mayer’s Coherence Principle is broken into three complementary sections “where learning is improved when: 1) interesting but irrelevant words and pictures are excluded 2) interesting but irrelevant sounds and music are excluded 3) unneeded words and symbols are eliminated” (Mayer, 2009). Using precise terms and excluding unnecessary items allows those with disabilities to focus on decoding the important aspects of each instructional design.

Attention Deficit/Hyperactivity Disorder (ADHD) is a disorder with three categories of characteristics. “inattentive – where the person can't seem to get focused or stay focused on a task or activity; hyperactive-impulsive – where the person is very active and often acts without thinking; or combined – where you see both characteristics (Virginia Department of Education, 2021). Since ADHD has mostly behavioral characteristics, we as instructional message designers must create messages that catch the attention of these individuals and keep them engaged. We can do this by using bright colors, catchy slogans, or activating their prior knowledge. Our challenge as designers comes when we are presenting our creations to an individual with ADHD which we will explain later in the chapter.

Autism Spectrum Disorder (ASD) as the name suggests has a wide spectrum of characteristics associated with the diagnosis. Cognitively, it is accepted that ASD has mild to severe deficiencies in learning and intellectual ability. The main characteristic of Autism is deficiencies in social interactions across the spectrum in all areas of interaction. “Many individuals [diagnosed with ASD] display challenging behavior including aggression, self injurious behavior, darting or wandering away, and over activity” (Virginia Department of Education, 2021). When all of this is combined into one individual the needs are great. Struggles with understanding information, lack of focus, and inability to read social cues from images and teachers forces instructional designers to take a step back and reflect on the content and design of each message. As individuals with Autism

Spectrum Disorder transition from high school to adulthood their struggles do not change but the supports available do.

It is recommended by the Virginia Department of Education, VDOE, that instructors use visual supports, structured routines, and accommodations to reduce cognitive load times for students with ASD (Virginia Department of Education, 2021). While the Department of Education works specifically for primary education the strategies they recommend are great for all areas of instruction, work, and life. For individuals who have mild to severe deficiencies in intellectual ability, the VDOE suggests using visual schedules, minimally distracting and clear work spaces along with a standard routine and expectation. A visual schedule is what it sounds like; a schedule typically broken down into hour or 30 minute blocks with pictures to represent the task to be completed at that time. For instance if a child got up at 8:00 am and got ready for the day there would be an image of clothing or a toothbrush next to that time on the visual schedule to let them know to get dressed or brush their teeth. They also can be manipulated for the individual with autism to remove an image when they complete a task or if they want to change the task. For individuals with clear social deficits the VDOE recommends using video examples, using timers to transition, having frequent breaks, and providing a space to unwind when the environment becomes too much to handle (Virginia Department of Education, 2021). Sensory overload is common for those diagnosed with Autism Spectrum Disorder, so having a place they can go to relax with dimmed lights and no people allows them to calm down from all the stimuli they receive while working or interacting with instructional messages. To also help keep those with ASD from sensory overload, designers should refer back to Mayer's principle and exclude any extraneous words and images (Mayer, 2009).

Figure 2
Visual Schedules



Note. Visual schedules are typically broken down into 30 minute or hour sections with an image to tell the reader what is happening at the time.

Instructional Message Design

Just as special education teachers look at the data and get to know their students, instructional designers must study their audience and look at data from previous or similar projects. Any young student, and any adult learner, can successfully use your instructional message designs if you think about the strategies used to keep it simple, yet in the past instructional designers have forgotten about disabilities when planning a message.

Rieber & Estes in accessibility and instructional technology stated “leading scholars of instructional technology have largely

ignored the issue of how to provide equal access to learning and education for people with disabilities”. In their review of all 690 articles published in *Educational Technology Research & Development* through 2013, only six pertained to people with disabilities (i.e. Garcia & Cuello, 2010; Hertzog & et al., 1989; Hollins & Foley, 2013; Mintz & Aagaard, 2012; Neuman, 1991; Tzeng & Schwen, 2003) (Rieber & Estes, 2017). The answer to making sure that special education students and adults with disabilities are not forgotten is to use a universal message design that ensures all people benefit from and can successfully use the designs we create.

We need to create instructional messages with a universal design for learning (UDL). UDL can be simplified into its three principles where everyone is engaged, represented, and is able to express themselves/act on their own. “A core value shared by Universal Design and UDL is that there are primary and secondary audiences who benefit from proactive, inclusive designs” (Rieber & Estes, 2017). UDL is used in the classroom with closed captions videos and large font on presentations, but it can also be used in everyday life after education. “Not only does a person in a wheelchair benefit from the convenience of a universally designed building with an elevator and ramp but so does a delivery person wheeling packages into the building on a dolly, a teenager on crutches who is unable to climb stairs, and a child who finds the ramp preferable to the stairs” (Rieber & Estes, 2017). Similarly, an educational video that is closed-captioned is of benefit to those with a hearing impairment as well as those in a noisy student center, café, when english is a second language, or in the quiet of home when others are asleep and turning the volume up may not be desirable (Rieber & Estes, 2017).

Creating a universally designed message means keeping things simple and thinking about those with needs in all categories. Once we start thinking and designing this way it will be more time efficient and cost effective than changing our designs later on for those with disabilities and diversities. “The combination of audio, video, text, and other means to convey meaning has the potential to provide students, with a range of abilities and disabilities, greater access to curricula and learning opportunities” (Hashey & Stahl, 2014, p. 71).

Although we as instructional designers need to keep things simple, we must still ensure that our designs are done with fidelity and

rigor. Use strategies to make it easier to understand, do not change the expectations or requirements of the audience. If you have no expectations you do not have a great design (Vanderbilt University, 2022). The audience still has to learn something even with strategies in place. An example as an educational designer of keeping fidelity is that when designing a math curriculum for algebra they could use 1 or 2 digit numbers in the equations instead of 3 digit numbers or use numbers that divide evenly into each other. This simplifies the question for students that have a learning deficit in math, but still asks them to solve a complex formula. Using this example designers also should start with the small or simple numbers and slowly work toward more difficult ones, potentially ending the curriculum with an extra enrichment activity that uses 4 or 5 digit numbers for those that excel in math.

To keep your designs simple enough for people with disabilities and for those who are having a tough time focusing we need to start learning about the audience's psychology and the way they think. "Cognitive learning theories, theories that explain learning in terms of changes in the mental structures and processes involved in acquiring, organizing, and using knowledge (Eggen & Kauchak, 2016). While someone is interacting with your instructional message designs to help them acquire and retain information, focus on one main idea, topic, color, etc. Using Mayer's Coherence Principle of eliminating extraneous information and images helps instructional designers create that main theme for each design message (Mayer, R., 2009).

Having one main message will help keep the audience's attention. Educationally defined as the "process of selectively focusing on one stimulus in the environment while ignoring others" (Eggen & Kauchak, 2016) attention is vital for having your design used properly. Once your design gets someone's attention, they have to perceive it as a meaningful message or they will find the next stimulus to focus on. Using a schema, a cognitive structure to represent information in a way that connects it to prior experiences, is a great way to make a message meaningful. For example, if I wanted to design a message about a new strawberry milk I would add a picture of a cow and a strawberry to the design.

Another tool to help with attention is chunking information on the design. Chunking is breaking information into smaller pieces by mentally, or physically, putting information into meaningful units

(Eggen & Kauchak, 2016). Paragraphs are a great way to show chunking. Can you imagine reading a novel without a single paragraph break? That would be too much for me to handle on a great day let alone someone who struggles with reading, comprehension, or focus. Recognition of chunking and schemas will help keep the audience's cognitive load, the amount of mental activity used to create a working memory, manageable (Eggen & Kauchak, 2016). People do not have unlimited memory storage for short term or long term memories. It is important to note that the more difficult it is to cognitively read a message the higher the cognitive load, and therefore more memory storage is used. It is our cognitive thinking processes that move information from one type of memory to the other. The larger the memory the harder it is for someone with cognitive processing disabilities to transfer and use the information remembered (Eggen & Kauchak, 2016).

Everyone is capable of comprehending messages in our designs if they are created and presented in a way that is both accessible and meaningful. To do that we need to use Universal Designs, schema, chunking, etc. to provide multiple opportunities for a variety of learning preferences, styles, diversity, and disabilities to successfully interact with our message designs. We also need to represent our message in multiple ways when possible, using text in multiple languages or reading levels and images and multimedia graphics. “By representing focused content in multiple ways and allowing learners multiple ways to act and express knowledge, UDL promises to develop recognition skills and strategic thinking” (Rieber & Estes, 2017).

Figure 3
Strategies that Work

	Chunking	Precise Language	Review Prerequisites	Time to Respond	Routines	Visual Schedules	Clear Workspace	UDL	1 Topic/Theme
SLD	X	X	X	X				X	X
ASD	X				X	X	X	X	X
ADHD		X	X	X	X	X	X	X	X
All Students	X	X	X	X	X	X	X	X	X

Note. This graphic created by the author, Brittney Heath, depicts different strategies that successfully helps those with disabilities decode the messages in each instructional design. The “x” represents that the strategy works for that given disability.

Online learning

Education and message design change yearly, if not even more often, and as instructional designers we need to be ready for these changes. The biggest change in the last few years is the mass influx of use on online learning platforms and the idea of learning solely online. “Online interaction between teachers and students is either synchronous, with teacher–student interactions occurring in real time (e.g., video chat), or asynchronous, with interactions occurring at different times (e.g., e-mail). Another approach to online education, blended learning, combines online learning opportunities with more traditional, face-to-face settings” (Hashey & Stahl, 2014). As students with disabilities are increasing each year it comes as no surprise that some of those students are enrolling in a form of online education. According to Mary F. Rice, students with disabilities are the fastest growing population in online learning platforms (Rice & Ortiz, 2020).

Online learning platforms like Google Classroom, Canvas, Blackboard, Moodle, Masterclass, etc. are used by children and adults all around the country to gain knowledge or a skill. These sites receive general maintenance updates as needed, but there are rarely big changes being made. Old platforms have old ways of thinking, ways invented long before instructional designers thought about accommodating those with disabilities or using universal designs. These outdated platforms, old unaccommodating layouts, and

cognitive overloading platforms are the reason we see high failure rates among students with disabilities in the online world (Grabinger et al., 2008). Even Zoom, a newer web conferencing service used during the COVID-19 pandemic, is not special education friendly. Students with disabilities often use a form of assistive technology to help them get the most out of an instructional message. For example, a student with a visual deficit might use screen-reader software to have text read aloud, or a student with a specific learning disability may need larger fonts or spacing between characters. Neither of these supports are available in web conferencing for online education (Hill, 2020). Online instructional messages do have their advantages for those diagnosed with disabilities though too. Those on Autism Spectrum Disorder are characterized with social deficits, so communicating on an online platform like canvas is less of a hardship for them. Educators also commented that they saw more eye contact and better social skills in zoom than in the classroom as students on the spectrum only had to look at their screen instead of a person directly to make eye contact (Hill, 2020).

Keep It Simple

Whether you are creating new instructional message designs or updating old ones the basic idea to make sure everyone can benefit from your instructional designs is to keep it simple. “The first step for practicing accessibility design is the simplest, but perhaps the most important: begin by making a commitment to do so on every instructional project you begin” (Rieber & Estes, 2017).

Just like a teacher when they are teaching elementary students how to read, we as designers need to use the same simple strategies. To teach comprehension, teachers activate prior knowledge, clarify big ideas, use graphic organizers, images, and use books with a specific text structure. This means when we are designing instructional messages we should use phrases or images that activate the reader’s prior knowledge and connects to something they already have long term memories for. Each design should have one central message idea with a few main colors.

Effective teaching, and instructional design, is when
“instruction promotes as much learning as possible in all students”

(Eggen & Kauchak, 2016). Keeping our designs simple and effective by thinking about those with disabilities during each step of the design process can be done with two questions. First, what is important for the audience to get out of your message design? If this is done effectively then question two is easy, what do we want the audience to be able to do (Eggen & Kauchak, 2016)? If your instructional design does not have a physical/tangible component to do after reading, then what do you want them to think about or say after interacting with your instructional message design?

To teach, and design, effectively we as creators have to be organized. Lesson plans, presentations, graphic designs all need to have some form of organization or the audience will not be able to read and follow the information in a meaningful way. A great way to stay organized is to prepare as much as possible as far in advance as you can, always start on time, and smoothly transition from one project to another (Eggen & Kauchak, 2016). You also should have some form of an established routine to keep yourself organized as you work on creating multiple instructional designs and larger projects. The most effective teachers and instructional designers have a main emphasis on one topic or one theme at a time. Using an emphasis on verbal and visual cues helps bring the focus to the important information on an instructional message design (Eggen & Kauchak, 2016). For instance, if I wanted to add emphasis to a specific sentence in my chapter I could bold it, use a large pull out quote, or add an image with the definition to draw your attention to that specific paragraph.

By keeping the instructional design simple for the audience it also keeps it simple for you as a designer. Making simple changes to break up text, use less text, and use only necessary images takes less time in the long run.

Accessibility

You as an instructional message designer can use all of these strategies and create the most amazing designs, but none of that matters unless it is accessible in a way that your audience can easily understand and use. The key ideas of accessibility are that it should have accessibility through the general design and literacy.

The general design should have a clear organization of goals and themes so that the content of the instructional message can be presented in multiple ways (Rice & Ortiz, 2020). Teachers can teach students to write notes through a printed out Powerpoint, graphic organizer, fill in the blank notes, and a piece of blank notebook paper. Instructional design messages need to be made in the same way whenever possible. Having these options allows the audience to find a way to use your instructional designs in a way that best suits their needs at that moment. This can translate to a billboard, flyer, brochure, tv ad, etc. for the same company asking you to create their designs.

To keep instructional design messages accessible a designer can inform the audience when a change in routine or design is coming (Rice & Ortiz, 2020). Giving individuals with disabilities this forewarning of upcoming changes allows them time to think and absorb the idea of the changes. This warning is especially helpful to individuals diagnosed with Autism Spectrum Disorder and others that have deficits in social settings. Since the disability makes it difficult to read social cues and the individuals are typically on a strict schedule any small change can become too much new stimulus to handle.

Part of accessibility is having the content be at a literacy level the audience can understand. This concept is something we all instinctively do. Parents read picture books to their children instead of reading an Advanced Placement (AP) chemistry book. R. Scott Grabinger explains that if we put the accommodations in our instructional message designs then the audience will not have to go look for help in decoding our messages. This means having lower reading level writing and explanations of how to use each feature (Grabinger et al., 2008). Having accommodations throughout the instructional message design is another part of the Universal Design for Learning that was mentioned earlier in the chapter.

Presentation Designs

A static design is great, but often instructional designers have to create for a company or school that will present the design later on so we need to keep in mind specific strategies for presentations that will allow anyone in the audience, including those with disabilities, to get the most out of the instructional message design.

As an audience member the hardest part of gaining information is decoding and comprehending the text as it is spoken in the presentation as slides are changed. To assist in decoding presenters can wear a microphone and have text to speech software to bring the words to the individual (Vanderbilt University, 2022). As helpful as seeing the words on a slide show are, not everything spoken is in the presentation so it is incredibly helpful to have every word written. Having this text copy of the exact presentation will allow those with disabilities having a deficit focusing on multiple stimuli, like ADHD, the chance to focus on the presentation now and the content later. You can also provide the entire audience with paper to take their own notes if they so pleased.

Watching a presentation also gets difficult when you have to remember and identify key concepts to use later. This again can be done with note taking, but it is best addressed by using a graphic organizer or other visual cues in the presentation (Vanderbilt University, 2022). For example, if I were designing an instructional message for a large company I would create a graphic organizer showcasing where each job title is ranked, then show just that title of the graphic organizer when I address the job requirements of that particular position. This way you can also identify the key information because if it is not key it will not be in the graphic organizer or have a visual attached to it (Vanderbilt University, 2022).

Now I understand some of these strategies and techniques to include those with disabilities are easier to implement than others, and that is ok. As long as you as an instructional message designer are trying to implement and constantly thinking about those with disabilities and deficits then you are already succeeding at creating a great message design. It might take you longer to create messages this way at the beginning, but it will soon become natural for you to work on it for every design. Also understand that teaching with these accommodations will also take more time for the audience in the

beginning, but they too will get accustomed to the changes (Vanderbilt University, 2022).

Conclusion

It is important for instructional designers and teachers to customize instructional message designs for all learners that will come in contact with their messages, including learners with disabilities. There are millions of learners that have been formally diagnosed and if we do not start creating instructional designs with disabilities in mind our profession will quickly be dismissed for something new. When you are creating, keep your instructional designs simple. When it comes to colors and images stick to one main theme with precise wording. If your design is longer, chunk information and use visuals to support the content. During a presentation of your instructional message design make sure that there is a way for the audience to take notes and when possible provide exact text of what is said.

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