Evergreen Evaluation & Consulting, Inc

NIMAC/NIMAS
Impact Report

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Florida Regional Braille Challenge℠
The Florida Association of District Instructional Materials Administrators
Hillsborough County Schools
The Prison Braille Network
The Kentucky Correctional Institution for Women, Prison Braille Program

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Executive Summary

The National Instructional Materials Access Center (NIMAC), created by IDEA 2004, is the national source file repository for K-12 instructional materials. The NIMAC receives NIMAS files from educational publishers and makes these files available to states for use in the production of accessible educational materials (AEM) for use by eligible students in K-12. The NIMAC, its external evaluator, Evergreen Evaluation & Consulting, Inc. (EEC), and the Florida Instructional Materials Center for the Visually Impaired partnered together to explore 1) the impact that AEM has in the lives of students when it is, and is not, delivered in a timely manner; 2) the ways in which the NIMAC/NIMAS support the timely delivery of AEM; and 3) the needs of stakeholders with regard to the NIMAC/NIMAS.

During interviews, teachers of the visually impaired (TVIs) explained that when students who are blind or visually impaired (BVI) have access to AEM at the same time as their sighted peers, they have equitable access to what they need to learn, are more likely to engage in active learning, and can build skills and abilities at the same pace as their sighted peers. This access also means that they are more likely to "own" and direct their learning. This is particularly important as students who are BVI often experience a lack of choice both in and outside of the classroom. Braille materials, however, are often not available, or are delivered late. This happens for a number of reasons, including, but not limited to: the print book adoption contract or purchase agreement did not require NIMAS, digital materials used in the classroom are not accessible (but are not available in NIMAS), classroom teachers create their own materials without giving enough lead time to produce braille, and the time and resources required to produce large numbers of braille books when new curricula are first adopted.

Parents of students who are BVI and TVIs agreed that when students don't get materials at the same time as their peers, they are significantly less likely to make the same learning gains and can also experience negative social and emotional outcomes. Students who are BVI may feel frustrated or have feelings of self-doubt as they worry that, without materials in hand, they're perceived as less capable by teachers and peers. These challenges are likely generalizable to the complete range of NIMAS-eligible students.

Survey and interview data with NIMAC users indicate that the NIMAC/NIMAS helps mitigate these challenges by facilitating the timely delivery of AEM. Data suggest that the NIMAC, in combination with the NIMAS file format and other facilitating factors, has made it more likely that students receive AEM in a timely manner. NIMAC users noted that a number of factors make this possible: through direct access to a central repository for NIMAS files, states can begin AEM production sooner than they could if they had to request files directly from the publisher; the standard NIMAS file format saves producers time because they can bypass scanning, spend less time formatting, and produce AEM that is equivalent to the print book; and the NIMAC's online system, website resources, and technical support increase the efficiency of NIMAS and AEM production workflows. Data suggest that when these time savings are leveraged collectively, it's more likely now than it was before the creation of the NIMAC for

students to receive AEM in a timely manner. This is significant because, as emphasized by parents and TVIs in Florida, when students receive AEM at the same time as their peers, they have equitable opportunities to learn and engage, grow and thrive, and develop the skills they need to be college- and career-ready.

Introduction

The National Instructional Materials Access Center (NIMAC) and the National Instructional Materials Accessibility Standard (NIMAS) exist in a context where many systems (e.g., pre-production, production, procurement, distribution, initial use, post-initial use), and factors within those systems, influence the timely delivery of high-quality accessible educational materials (AEM). The contribution that the NIMAC/NIMAS make to ensuring the timely delivery of AEM within these systems is therefore challenging to isolate. One way to begin to tease apart NIMAC/NIMAS' contribution, and to understand the complex phenomena of AEM production and delivery, is through a case study. To this end, Evergreen Evaluation & Consulting, Inc. (EEC), as part of its external evaluation contract with the NIMAC, used a case study approach to explore the ways in which the NIMAC/NIMAS support the timely delivery of high-quality AEM.

We sought to answer three evaluation questions through the case study:

1. How are students impacted when AEM is, and is not, delivered in a timely manner?
2. In what ways do the NIMAC/NIMAS support the timely delivery of high-quality AEM?
3. What are the current and future needs of stakeholders with regard to the NIMAC/NIMAS and AEM?

This case study utilized a mixed methods approach, collecting both quantitative and qualitative data to answer these questions. In Part I of the case study, we explore the role that braille plays in the lives of students who read braille, their parents, and teachers of the visually impaired (TVIs). We use findings from interview and survey data to describe: 1) how the timely delivery of braille positively impacts students, 2) the factors that impede the timely delivery of braille, and 3) the myriad of challenges that students, TVIs, and parents encounter when braille is not available in a timely manner. Some of these challenges are likely generalizable to the complete range of NIMAS-eligible students and their network of supporters. As such, we use Part II to explore how the NIMAC/NIMAS address the challenges that are more universal in nature by facilitating the timely delivery of print- and technology-based AEM. We conclude with a summary of the technical assistance (TA) needs identified by NIMAC users and a list of specific ways in which braille and other types of AEM can be improved to support learning.

This case study is part of an anticipated series of case studies that EEC will conduct in the coming years. If this approach produces meaningful and actionable data for the NIMAC and other stakeholders, EEC will use a similar approach to explore the link between the NIMAC/NIMAS and the timely production of other types of AEM in the future.

Methodology

To better understand the role that braille plays in the lives of students, teachers, and parents, EEC and the NIMAC established a collaborative working relationship with the Florida Instructional Materials Center for the Visually Impaired (FIMC-VI) in September 2019. In the fall of 2019, the NIMAC, FIMC-VI and EEC co-developed four data collection instruments to explore:

- The ways in which students benefit from braille.
- The factors that contribute to this benefit (e.g., getting braille on the first day of school, using braille with tactile images).
- The needs that braille-reading students, parents of braille-reading students, and TVIs have with respect to braille.

The four data collection instruments that were co-developed follow:

1. Parent survey (The National AEM Center reviewed and provided recommendations that helped clarify a number of parent survey items).
2. Parent interview protocol
3. TVI survey
4. TVI interview protocol

FIMC-VI administered the parent survey during four Florida Regional Braille Challenge℠ (FRBC) events[1] that FIMC-VI hosted between January 2020 and March 2020. In total, approximately 182 family members of students who are blind or visually impaired (BVI) attended the FRBC events. Of the 182 registered family members, 70 parents responded to the survey. One survey was immediately excluded because the respondent only completed the first four questions on the survey. Of the remaining 69 surveys, 39 surveys were included in the quantitative analysis. When analyzing the data from one of the FRBC events, EEC identified inconsistencies in the data (n=30). After some investigation and consultation with the NIMAC staff, EEC decided to exclude those respondents from the analysis of the forced/multiple choice questions, but included the qualitative comments from all 69 surveys in the final analysis of those data. It is not possible to determine the response rate because, in addition to parents, registered family members included siblings, aunts, uncles, grandparents, etc.

In January 2020, FIMC-VI administered the TVI survey to 250 TVIs. In total, 63 TVIs responded to the survey for a response rate of 25%. EEC conducted interviews with parents and TVIs to further explore and validate survey data.

[1] The Braille Challenge was created by the Braille Institute in California. It is intended to offer students who read braille, who typically are not recognized for their braille skills, the opportunity to demonstrate their skills, compete, and win prizes. Students who win at state competitions may compete at a national event.

To better understand the roles that the NIMAC/NIMAS play in the timely delivery of high-quality AEM, EEC and the Director of the NIMAC co-developed seven data collection instruments in the fall of 2019:

1. Authorized User survey
2. State Coordinator survey
3. Hybrid State Coordinator survey
4. Accessible Media Producer survey
5. Publisher survey
6. Vendor survey
7. NIMAC user interview protocol

In January and February of 2020, EEC administered surveys to each of NIMAC's six user groups. In March 2020, EEC conducted interviews with NIMAC users to further explore and validate survey data. EEC also conducted a number of in-person observations at: a procurement conference for district procurement administrators in Florida, an instructional materials center in Florida, one braille production facility in Kentucky, one prison braille program in Kentucky, the Prison Braille Network Conference, a FRBC event in Tampa, and three public schools in Hillsborough County, Florida (one elementary, middle, and high school). Please see Appendix A for a list of the data collection methods that EEC employed.

Part I: The Role that Braille Plays in the Lives of Students, Their Parents, and Teachers of the Visually Impaired (TVIs)

Hillsborough County, Florida: January 2020

"I know all the shortcuts!" This is what a seven-year-old braille reader excitedly announced when I sat next to her and her TVI. She was completing a reading assignment in braille at a small table in the school's resource room. Her TVI sat across from the student, and a transcriber was transcribing at her desktop computer a few feet away. For the next few minutes, she jumped back and forth from reading her assignment to telling me about herself and asking me about myself. When she finished, the TVI extended a jar of jellybeans. The student carefully selected her five jellybeans.

There are approximately 3-4 braillists and 13-15 braille readers in Hillsborough County public schools. This group accounts for 5% of the roughly 300 students who are blind or visually impaired (BVI), and 0.007% of the approximately 220,000 students in the county: a "microgram," as described by one TVI. A number of TVIs described Hillsborough County as a "good" county for braille-reading students. One TVI noted, "Here, we're lucky. We have a lot of good teachers." Another shared, "Our school district is enlightened because of the fact that they hired a braillist in-house."

Most of the braille readers in Hillsborough County attended the FRBC event in Tampa. Liz Anderson, Program Coordinator at FIMC-VI and one of the FRBC organizers, shared that the Braille Challenge was created by the Braille Institute in California and aims to offer students who read braille, who typically are not recognized for their braille skills, the opportunity to demonstrate their skills, compete, and win prizes.

During the FRBC, EEC conducted eight interviews with parents and one interview with a TVI. EEC also interviewed a fourth-year college student who is blind and the keynote speaker who is blind. Although the case study was designed to explore the experiences of students in K-12, the interview with the college student sought to retrospectively explore this student's experience in primary and secondary school. During this event, and the three other FRBC events in Florida, parents also completed a brief survey designed to capture their thoughts and opinions about the benefits and challenges related to braille. A total of 69 parents completed the survey across all four events. To further explore TVIs' thoughts and opinions with respect to braille, EEC conducted four additional interviews with TVIs, and FIMC-VI administered an online survey to over 250 TVIs across Florida. In total, 63 TVIs completed the survey. In the following sections, we summarize what EEC and the NIMAC learned from survey data, interview data, and in-person observations.

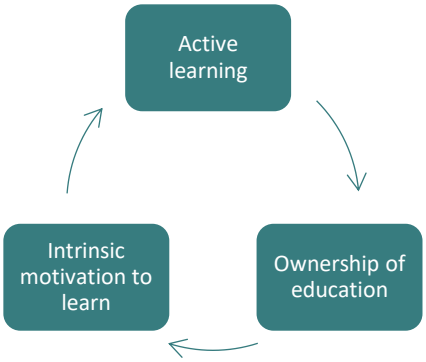
Braille Benefits

Braille Promotes Active Learning/Ownership of Learning

During an interview in a school resource room, one TVI shared that having access to and using braille promotes active learning. She reflected, "if you're always just listening instead of actively seeking your own information, that's not active learning. If you're saying, 'let me use the glossary, and table of contents…' that's active learning." She noted that active learning promotes ownership of learning, and ownership of one's own learning can also cultivate intrinsic motivation to learn and engage in active learning. The cyclical nature of this process is illustrated in the figure on the right.

Figure 1

Cycle of Active Learning



A number of TVIs underscored how ownership of learning is particularly important among braille-reading students because they can experience a lack of choice both in and outside of the classroom. When a braille-reading student listens while their sighted peers read, it denies them the opportunity to take control of their education. Simply put: "If they don't have the materials, the adult has ownership." For example, one TVI shared:

> Sometimes the kids will just sit in class. They'll tell me, "I just listened." But no one else was just listening. [The other students] are taking control of their education. The English teacher will say, "Well, it's O.K." And I'll say, "No, it's not O.K." Giving them access to braille encourages them to ask for more and be more in charge of their education.

Braille Enables Independence

Interviewees underscored how braille enables students to learn independently and to do daily activities on their own. For example, a college student reflecting on her time in high school shared:

> Braille for me, it's really brought an impact to my life. I didn't have to have anybody read anything to me, which is awesome…it helped me in a lot of ways as far as me being able to learn independently and grasp concepts. When I have braille, it's really easy for me to be able to process information. That's just how I learn.

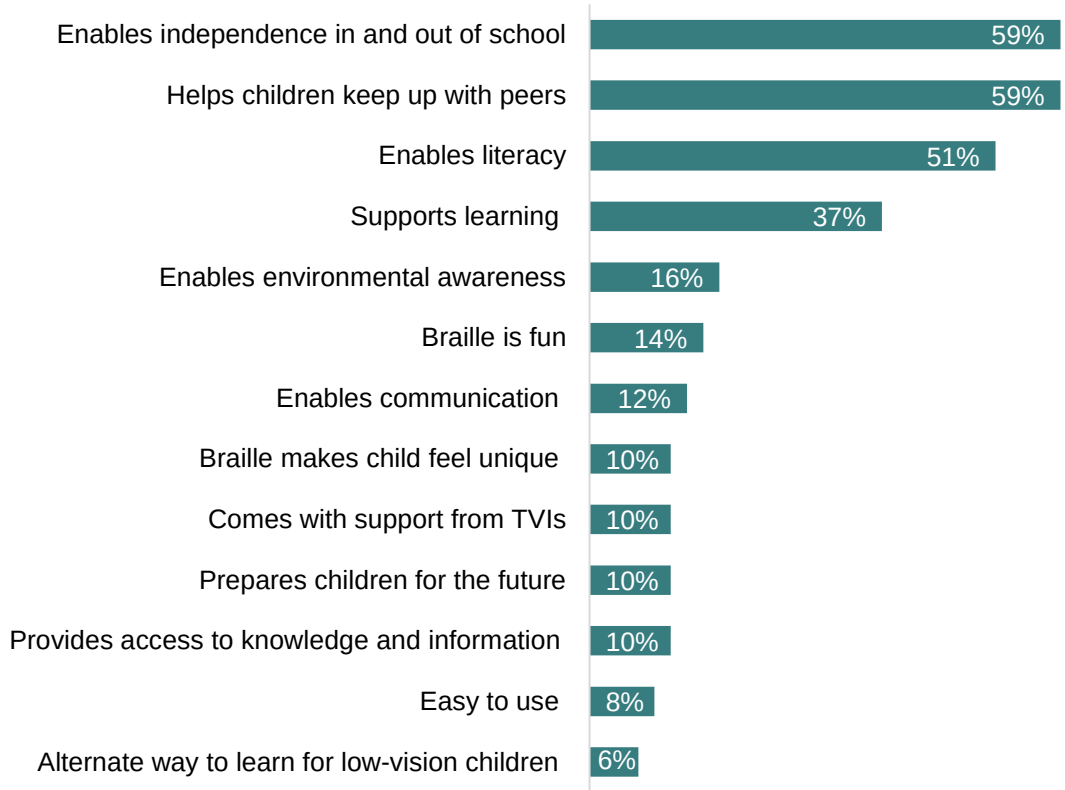
Similarly, a TVI described how access to braille materials and maintaining the same expectations for blind students as their sighted peers has enabled her students to become independent and productive citizens. She shared:

> The students I've taught have gone on to be independent of their parents, some are married, some with children, some in college living on their own. I don't think that would happen if they didn't have the same expectation and type of education that their sighted peers had, and that includes having materials.

A parent of a student who is BVI who also has autism shared that braille is her son's "connection to the world." She explained, "He's more independent when he works. When he needs to explore something or a subject, he finds information independently. He does it himself without help." Many parents who completed the Parent Survey at the FRBC events also agreed that braille supports independence. In open-ended responses, the 49 parents who provided responses shared 152 things that they/their child like about using braille in school; one of parents' most common likes was that braille enables independence. The different things that parents reported liking about braille are listed in the chart below. Each percentage represents the proportion of parents that liked a given factor.

Figure 2

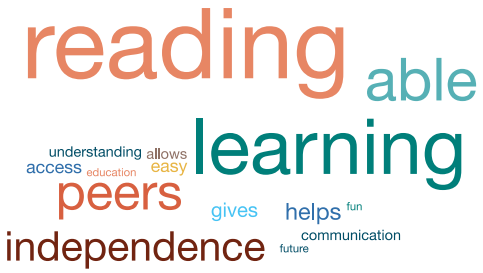
What Parents/Their Children Like About Using Braille in School (n=49)



The largest words in the word cloud below are some of the words that parents used most frequently to describe what they/their child like about using braille in school.

Figure 3

Word Cloud of Parent/Child Likes



Braille Levels the Playing Field

Interviews with TVIs and TVI survey data indicate that braille makes it possible for students to have equitable access to what they need to learn. One TVI shared, “Braille makes it so you’re on the same playing field as your peers.” Additionally, of the 49 parents who responded to this question, 59% (n = 29) indicated that they liked that braille helped their child to “learn at pace” with their sighted peers. One parent shared that braille “keeps my child in the loop with what others are doing.” Another shared that braille enables their child to “learn just as much as his sighted peers.” And two other parents reflected that braille helps their child “read about the pictures they talk about” and “participate with class/assignments.”

A number of parents also emphasized that braille helps their child learn. Indeed, 36% (n = 18) of parents who reported what they/their child like about braille said that they like that braille helps their child learn. One parent shared that braille “provides a better education/easier”; another shared that braille helps their child to understand concepts “not learned through verbal instruction.”

TVIs underscored that a critical component that helps students keep up with their peers is using tactile graphics, especially in math and science. One TVI shared that tactile graphics “break down the pieces” of concepts, systems, and processes. Tactile graphics are essential to learning, in part because students who are BVI do not experience incidental learning like their sighted peers. One TVI explained, “Here’s the thing about blind children, when you’re blind you have to be actively taught basically everything. There’s no incidental learning…they have to use certain materials.” Tactile graphics are a critical component of those materials.

Because of the important role that tactile graphics play in supporting learning, TVIs that were interviewed shared that they work hard to ensure that students have tactile graphics in hand when they need them. One TVI explained that when the graphics are more complex (e.g., the human brain), she’ll produce graphics and share them with students ahead of their class. She

emphasized that this "pre-exposure" creates a level playing field. She explained, "with more complex graphics we give them [to students] ahead of time so they can pre-explore before class. Otherwise it's a lot of information. So, when the teacher says, 'frontal lobe,' they know, 'Oh, it's this part.'"

Braille Equips Students with Skills to Be College/Career-Ready

Survey and interview data suggest that learning braille in school can equip students with the skills they need to perform well after graduation in a way that auditory learning alone may not. During parent interviews, one father whose daughter has a progressive eye disease shared, "It's huge to know that braille is there, that she has a tool to be able to accomplish what she can." Similarly, a mother shared that learning braille has positioned her daughter to pursue writing. She emphasized that because her daughter learned braille, she learned punctuation, spelling, and writing structure. With regard to college and career opportunities, she stated, "Braille just opened up a whole other world to her."

A number of parents who completed the FRBC Survey also shared that braille helps their child become literate, and literacy opens up a world of opportunity and choice. Of the 49 parents who responded, 51% (n = 25) indicated that they liked braille because it helps their child develop literacy skills. One parent wrote that braille helped her daughter learn punctuation and formatting documents, and another wrote that braille helps their child "learn how to spell words." Lastly, one parent's comment, "braille makes my child want to read," suggests that once a student has literacy skills, they may be motivated to continuously enhance these skills through reading.

The guest speaker at the FRBC in Tampa also underscored that "literacy for your blind child is through braille." He went on to describe how learning braille equates to being literate and how being literate enabled him to pursue anything he wanted, including: wrestling in high school, going to college and graduate school in New York City, becoming an elite cross-country skier (he was considered for the Paralympics team), and running marathons. During an interview he explained:

> Braille in its most fundamental form, braille is literacy for me. I use it to read email, it taught me how to spell, the rules of punctuation, it provided me with a way to tell time, an effective way to take notes. For the last 20 years, for my jobs I've traveled, gotten to the right elevator floors, the right hotel room, I've been able to label my several thousand CDs, and read bedtime stories to my child. It's simply part of who I am. It's the reason why I thrive.

Parents and TVIs emphasized that because "the world of braille is much, much smaller" when students leave high school, it makes it all the more important to optimize the learning that braille affords with respect to literacy. As one TVI explained:

> When they go to college, they don't have a vision teacher. When they go to college,

> they're not going to buy a $50,000 English book. So why learn braille if that medium won't be universally available? Because when you teach braille, basically you're telling the kid, "I want you to be literate."

Braille Enables Environmental Awareness

During parent and TVI interviews, a number of interviewees noted that braille helps their child/student navigate their physical surroundings. They underscored that being able to navigate their surroundings can position them to learn and live independently. A college student explained that posting braille in public places not only helps her navigate her surroundings, it also engenders a sense of connectedness and support. She shared:

> I really appreciate that elevators have braille. It's a necessity. It's really helped me. I love that—having it there. It feels good, it feels like I'm being listened to, and that I'm cared about.

On the Parent Survey, eight respondents reported that they like that braille helps their children navigate their surroundings. One parent shared, "He looks for it out in public and is learning how it can assist him as he gets older and more independent." Another shared, "She likes being able to find her classrooms on her own and knowing where the escalators are at malls (lol)."

TVIs Provide Significant Support to Braille-Reading Students

Input from parents makes it clear that TVIs play a critical role in ensuring their child's academic and social and emotional development. One parent of a 5th grader shared:

> We've been so fortunate with [our TVI] advocating for her because she helps her navigate. She sees her for 30-40 minutes a day. The resources, the time, it's always been so important. I couldn't even describe it, [her TVI] has always been her greatest advocate there in school...I can't even describe all the things that she does, it's been so great.

Another father shared that his daughter's TVI helps him to support his daughter. He explained that the TVI would produce braille and write on the braille so it was easier for him to help his daughter learn. He remembered, "when we started out, they printed everything off she needed. I'd buy books and they'll print everything for her. For her schoolwork, they'd braille it and then write on it for me."

In addition to supportive TVIs and paraeducators, parents shared that a supportive school environment is critically important for their children's academic, social, and emotional development. One mother shared, "we were blessed with an amazing vision teacher … the vision teachers were just on it, 99.99% of it. From K-8 he was at the same school, the teachers, the principal, the vice principal, the kids, they all supported him."

The support provided by TVIs and paraeducators may be especially critical when sighted peers bully students who are BVI. One mother explained that her daughter "is very shy, so she doesn't feel comfortable telling the other students that she is visually impaired. They don't know, and they keep bullying her because her eye looks different." Another mother of an elementary student shared that her son "is the only low vision kid around … they all knew him [at his school] before his diagnosis, but we heard 'googly eyes' the other day." Thus, the advocacy and support that TVIs provide may serve to mitigate the harm caused by bullying.

Braille Challenges

Baseline Challenges

Parents and TVIs shared that students who read braille need to navigate a number of every-day, or baseline, challenges. The guest speaker at the FRBC event explained that:

> Everyday activity takes a lot more effort on our part. Not getting the visual social cues is stressful, trying to remember where that next class is, is stressful and embarrassing and it's a heck of a lot more involved. It takes more energy and effort to stay on an even playing field with our compatriots.

School Challenges

These baseline challenges can be compounded in school starting in pre-K. One TVI shared that students in pre-K are often:

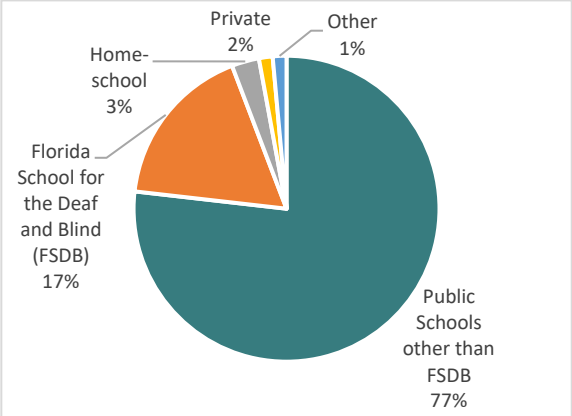
> already disadvantaged and they're entering way lower to their peers. Their peers have seen letters their whole life and the first time a blind child is seeing a letter is when the TVI comes and says 'this is an A.' The class doesn't read braille and the TVI only comes in a few times a week.

Other parents and TVIs agreed that schools may not offer the supports that braille-reading students need.

For example, one parent shared that her daughter went to public school through middle school and then transitioned to private school. The parent explained that her family made this choice because they were frustrated that the school wasn't meeting their daughter's needs. "We were really frustrated by what was happening in public school…some of it was technology like with the iPad. The school was not keeping up. They said, 'that's a high school thing.' We said, 'well, she's ready now.

Figure 4

Type of School Children Attend

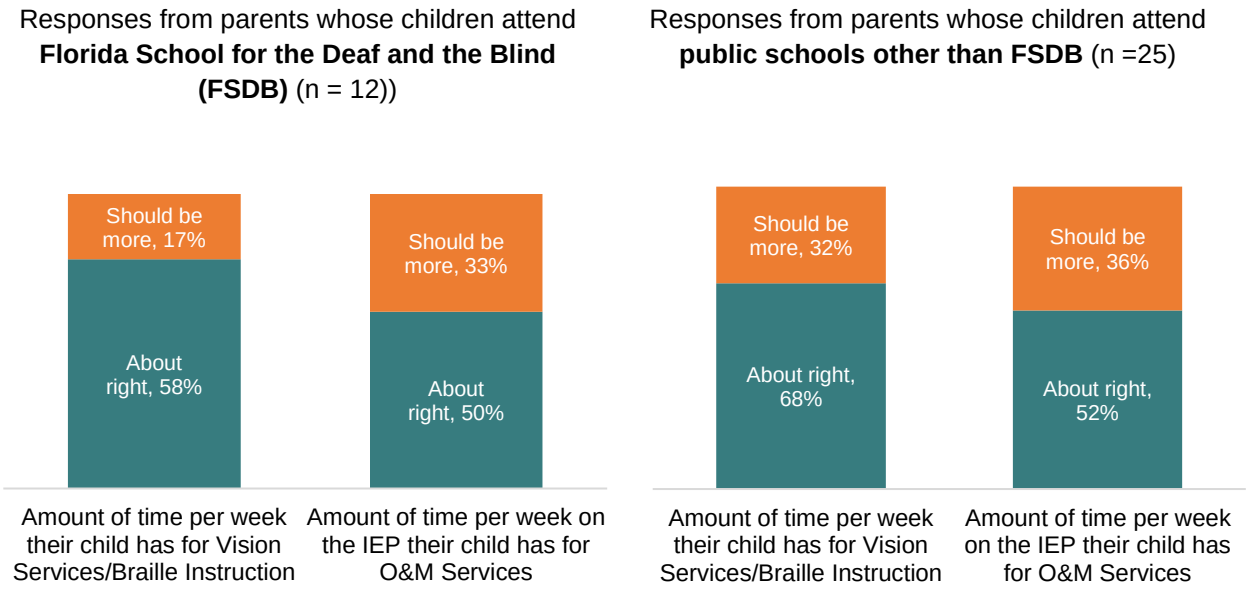


The pie chart above represents where parents (who completed the Parent Survey, n = 69) reported their child attends school.

As shown in the charts below, some parents reported that the amount of time per week their child has for Vision Services/Braille Instruction and O&M Services should be more. While responses from parents of children who attend FSDB and parents of children who attend other public schools tend to be similar, one small difference is that an additional 15% of parents whose children attend public schools other than FSDB believe that the amount of time that their child has for Vision Services/Braille instruction should be more.

Figure 5

Amount of Time Per Week on Vision Services/Braille Instruction and O&M Services (n=39)



Hard Copy Braille Can Be Cumbersome

A number of TVIs also noted that the sheer size of braille can be a challenge to transporting materials and to learning. [College Student] “In high school, one of the disadvantages is that my book wouldn’t be in one single book, it would be in volumes. I had a geometry book that was 121 volumes so that’s a disadvantage...because if I grabbed the wrong volume, I couldn’t do a homework assignment. There have been times where I’ve had to grab 2 or 3 volumes to do one assignment. That’s a big disadvantage.”

See Appendix B for a detailed description of TVI and parent recommendations for how braille can be improved to support learning.

Learning Braille Is Challenging

Some parents noted that braille can be challenging to learn because it’s a skill that their children need to learn in addition to class content. For example, one parent shared:

> My son is in a mainstream classroom and he gets daily support on vision. He’s doing everything that’s required in class, but he’s still learning braille. He’s learning double. He can get discouraged. Braille is cumbersome…if it were letter for letter that’s one thing. But it’s a whole new coding language…and contractions make it overwhelming.

Another mother of a student who is BVI shared that her family moved from another country and needed to learn English. This meant that her son needed to learn the English language and also learn a new braille code. The mother explained, “He had to learn to speak English and learn English braille. The contractions are very hard, it took eight years.” Because she helps her son learn, this parent, like many other parents who were interviewed, also needed to learn the braille code. She explained, “I learned braille in Spanish. In English it’s really hard…when I try to write and read in English, the contractions are really hard for me.”

During an interview, one TVI shared that the difficulty that students have in learning braille is significantly influenced by *when* they lost their vision. She explained that when students are born blind, or lose their vision at an early age, they experience fewer challenges than students who learn braille later in life due to progressive conditions, diseases, or an injury that impairs their vision. The challenges that these students encounter often go beyond learning the code and into questions about self-identity. One TVI explained that, unlike congenitally blind students, braille is something new and unfamiliar to these students. Because of this, they might think that using braille sends a message to their peers that they’re different. Learning braille can also reinforce for these students an uncomfortable reality (the loss of sight) that they may not be ready to accept. She explained, “If they’re a braille reader then they think, ‘I really am blind.’ So, braille is something they want to reject.”

In addition to experiencing challenges while learning the braille code, students can also encounter challenges when learning how to use assistive technology (AT). When a student who

is BVI needs to learn how to use AT, this often means that he or she needs to learn an additional set of skills, above and beyond what their sighted peers are required to learn. For example, one TVI shared that there are “a million keystrokes and commands” that a student has to learn to use text to speech. Another TVI explained that learning how to use AT can be especially challenging for students in earlier grades. She explained:

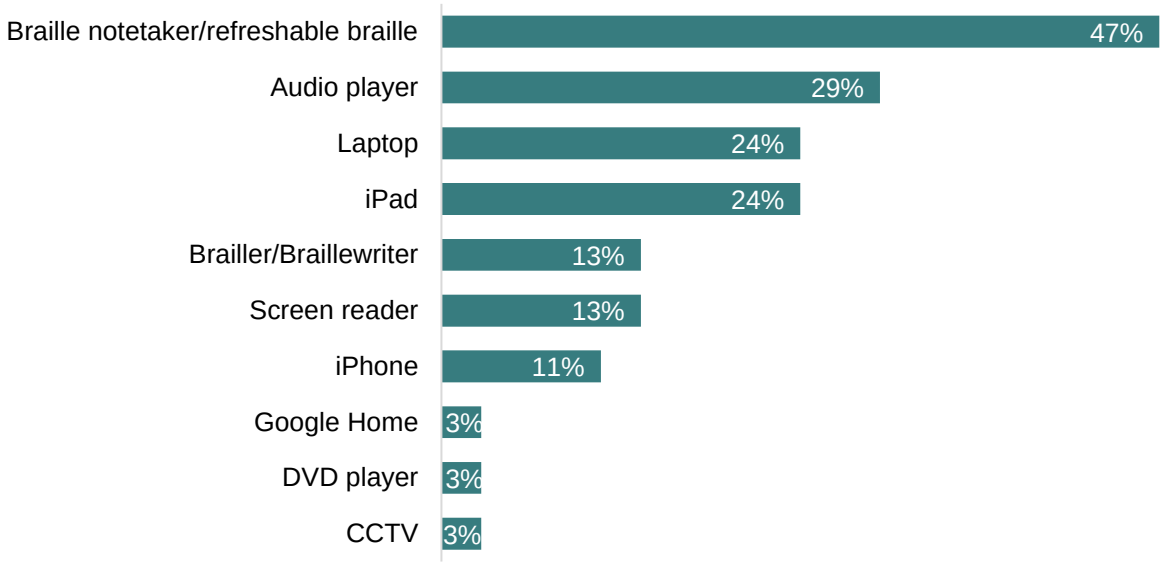
> If you want them to use a screen reader, they have to use commands, save their file with the S, and then name the file. They’re trying to learn the braille, learning how to write, and then learning how to read, and then learning how to operate a piece of equipment on top of all those other skills. Point and click [for sighted peers] is not the same as listening and learning commands to operate devices.

Although AT can be challenging to learn, TVIs and parents agreed that having access to a variety of AT on a regular basis can offer significant support for their child. One mother whose son has a progressive eye disease shared that it’s important that her son learn how to use AT (e.g., braille display) now, because hard copy braille will not be available on the job.She explained, “…you think about when they get out of school, is your employer going to provide braille? You need to use your tools. You can use a braille display to write in braille.”

Of the 32 parents who responded to the question about the types of AT their children use on a regular basis, 47% indicated their students use refreshable braille regularly, while (29%) indicated students use an audio player on a regular basis.

Figure 6

Type of AT Used by Students (n=32)



TVI survey data also suggest that AT is critical because it makes digital materials, which classroom teachers increasingly use, accessible to students who are BVI. TVIs reported that

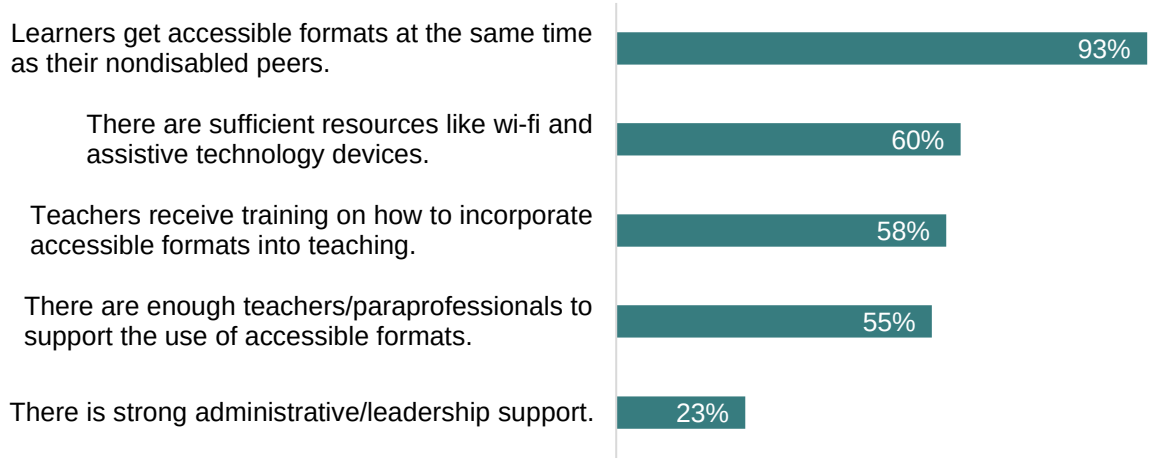
when classroom teachers use digital materials, braille readers often access the material through screen reading software such as JAWS® or NVDA and a refreshable braille display. During interviews, a number of TVIs also noted, however, that a learning disability can make learning AT and braille significantly more difficult.

The Most Significant Challenge: Getting Materials Late/Not Having Materials

TVI and parent data suggest that the most critical factor in ensuring similar learning gains between braille-reading students and their sighted peers is providing students with accessible formats at the same time as their sighted peers. For example, when asked to identify the three most important factors that can help ensure similar learning gains, 93% (n = 37) of TVIs who completed the Florida TVI survey reported that when learners get accessible formats at the same time as their sighted peers, they are able to make similar learning gains. The percentages in the bar chart below represent the proportion of TVIs who reported that a given condition was one of the three most important conditions that support similar learning gains.

Figure 7

Most Important Conditions that Support Similar Learning Gains



Parent survey data from FRBC events also indicate that 82% (n = 32) of parents agreed or strongly agreed that the *availability* of braille materials in schools allows students to learn as fast as their sighted peers. In total, 92% (n = 30) of parents also agreed or strongly agreed that when braille readers do not have materials at the same time as their sighted peers, these students are disadvantaged compared to their sighted peers. Despite the importance of receiving accessible materials in a timely manner (at the same time as sighted peers), only 46% (n = 18) of parents reported that their child *always* receives materials on time.

How the Lack of Braille Materials Can Impact Students and Teachers

Negative Impact on Social and Emotional Well-being

Parents and TVIs alike frequently shared that when students do not receive materials at the same time as their sighted peers, it can have a negative impact on their social and emotional well-being. When students who are BVI are *not* working with the same materials at the same time as their sighted peers, their sighted peers and teachers across K-12 and college may interpret this as a sign of incompetency. For example, one college student shared:

> It's a stressful thing if you don't have what you need to do your homework. You basically can't do the assignment and you have to tell the teacher. It's so demeaning. That doesn't feel good. It's an impact that I would like other instructors to realize. And I'm not sure how to get other teachers understand it.

A parent shared that her son had a similar experience:

> It used to tick him off when the teachers didn't have the braille. That happens a lot, especially for tests. If the teacher didn't get it to the transcriber in time, he'd have to leave the room along with the vision teacher to take the test. And what is that telling his classmates? That he doesn't have to take the test. He wanted them to see that, "I'm doing the same thing that you are – my grades are based on the same work." When he had the braille, his peers saw him as someone who could do the same work that they could do.

A TVI shared that students who are BVI respond the same way that anyone would respond if they didn't have access to the same opportunities as their peers:

> If I got a textbook for my kids at this level [middle school] and it didn't have graphics, I'd be angry first, and then discouraged, and that's what happens to kids when they're not getting the same amount of info as everyone else.

The need to have accessible materials in a timely manner spans across all age groups. One TVI shared how accessible material for pre-K students can give them a way to be involved and engaged in a setting where they might otherwise not be engaged. The TVI shared:

> One time, in pre-K, there was a teacher who blew up a balloon every day and she'd talk about other objects. The student was just sitting there. So, I made a book with objects and descriptions. I stapled the balloon to the book. Every day she would turn to that page when the teacher blew up the balloon. At 3, other kids are seeing the symbols and the language, they're seeing it. So, I wanted her to get her hands on it and know that at some point these little bumps are going to mean something to you. With that book, she

> was able to fully participate like her peers were. Every time we sat down, she said, "My book!" She was so eager to be involved because now she had the same access that all of her peers did.

Not Having Braille Can Hinder Independence

A number of TVIs agreed that not having braille materials can result in complacency and impede students' ability to become independent learners. As one TVI explained, when students don't have materials, someone often needs to be with the student at all times. She explained that this type of support does not exist in college or on the job. She emphasized that without materials and with "someone in your ear feeding you info all the time," students can become complacent learners. She went on to say that not having the material trains students who are BVI to be indifferent. "When you don't have it, you train that child to be indifferent…then you get learned helplessness. All these things that we're trying to combat." She stated:

> Independence is the biggest thing they need to learn…in essence, by not providing braille materials, we're sabotaging that mandate. Right off the bat we're impeding our expectation that they be independent humans if they're having to rely on someone else all the time.

TVIs/Transcribers Need to Produce Braille Locally

While most schools rely on national organizations such as the American Printing House for the Blind and other agencies to produce braille textbooks for students, many TVIs must also produce braille locally to ensure that students who are BVI receive materials at the same time as their sighted peers. For example, of 28 TVIs whose students use braille, 100% indicated that they produce braille locally when digital instructional materials are not accessible.

During interviews, TVIs emphasized that producing braille locally is not ideal and does not guarantee that students who are BVI receive materials at the same time as their sighted peers. Data suggest that producing braille locally presents a number of challenges that impact both students and teachers. In particular, producing braille: 1) often requires that TVIs and paraeducators commit a significant amount of time, 2) may take learning opportunities away from students who are BVI, and 3) does not always result in learners receiving materials at the same time as their sighted peers. We explore each of these impacts in detail below.

During interviews, TVIs shared that creating braille materials requires a significant amount of time and effort. A college student remembered, "my vision teachers have been up nights brailling. That's too much, they should be at home with their kids and family." And one TVI shared said she often works a 15-hour day to ensure that her students have their materials on time. She shared:

> I work 15 hours a day because I'm a full-time teacher but I'm also brailling materials before and after school. We're brailing four different levels of math textbooks,

> workbooks, all of the supplementals, the PowerPoints, especially math, that's time intensive. I'm often here on weekends. I have a master key to the school to work on braille. I'm here probably most days. The only other people that are here are the custodians.

Producing braille locally can also take learning opportunities away from students. One former TVI remembered:

> In high school that was a huge part of my planning time. You'd have to six-key [manually type in] in the math, looking at the book and then six-keying it. Teachers could do a lot more for the kids in their planning time if they weren't doing this. Instead of using planning time to produce braille, we could be planning lessons in career exploration.

The process to produce tactile graphics can be particularly time intensive. One TVI explained that this time intensive task has become even more laborious because "60-70% of books now have graphics. When kids are taking state tests, they're full of graphics." Another TVI explained that:

> You want your graphics to be functional and you really have to take time to make sure you're not using similar material. Sometimes I've had to make two different graphics of the same graphic. One needed to be simple, and one needed the complete details.

She described the multiple steps involved in making complex graphics: "I'll take a copy of the brain, blow it up, and then start cutting all the pieces. And then we have sticky foam, puffy paint, glue dots, everything to make each section feel different, and then I make a key."

Despite the time it takes, all TVIs who discussed tactile graphics were committed to creating the graphics. One TVI explained, "It helps students pull in experiences that help them learn. I'll spend hours brailling graphics, even if the kid only looks at it for one time."

Reasons Why Braille Materials Are Late/Not Available

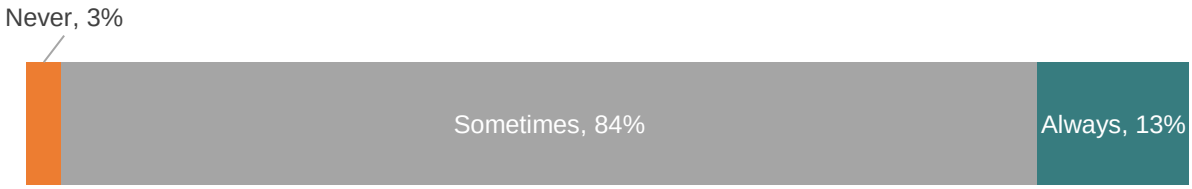
Interviewees shared a number of reasons why braille materials are not delivered in a timely manner. A summary of each of these reasons follows.

Some Digital Materials Are Not Accessible

Data suggest that the increased use of digital materials may make it less likely for students to receive materials at the same time as their sighted peers. For example, as shown in the chart below, of 31 TVIs, only 13% (n =4) reported that when digital materials are not accessible to their student(s), a braille version is readily available through FIMC-VI and/or Bookshare.

Figure 8

Availability of Braille When Digital Materials are not Accessible



Interviewees emphasized that not having accessible digital materials in the classroom is a real concern, especially since more classroom teachers are using digital materials. One TVI explained that when the platforms are just text, their students can follow along. But in her experience, most platforms are not just text. She explained, “Lots of the platforms are pictures. Our screen reading programs don’t read pictures.” If the TVI doesn’t have a companion print textbook that they can convert into braille, the TVI or paraeducator needs to sit and read the content to the student. TVIs explained that this creates inequity because it means that 1) teaching and learning will take more time for these students, and 2) learning can be more demanding on students who are not auditory learners. A quote from one TVI illustrates how this inequity can play out.

> If I’m in a reading class and I’m reading everything to you then it becomes a listening comprehension class, not a reading class. If there’s a curriculum that they can’t access, why are we wasting our time in this class?

This TVI explained that in some cases, when the digital material is not accessible, the classroom teacher will say, “they can just do this alternative assignment.” The TVI’s response to this is simply, “No.”

Another TVI shared that the use of digital materials across all grade levels can put students who are BVI behind even before they start elementary school. She noted:

> Pre-K classrooms are already accessing digital materials and students are already disadvantaged because they’re in the computer lab every day. Sighted students will go to computers, log themselves in, and do ABC Mouse for 15 minutes. Then they do i-Ready for 45 minutes a day. What’s the blind child supposed to do? I know when I leave that class, she’s going to spend a lot of that day idle.

This TVI went on to explain that many teachers do not engage their students who are BVI in learning exercises so that they can achieve the same learning gains as their sighted peers. For example, she shared that in a pre-K classroom, a teacher gave a hard copy braille book to a student who is BVI while his peers were in the computer lab. The classroom teacher said, “We’ll just give him that, or just give him something to play with.” The TVI emphasized that these “workarounds” are insufficient and inequitable.

Another TVI explained that this problem of inaccessible digital materials continues through

elementary and middle school. For example, in elementary school, students are tasked with writing essays based on multiple electronic sources. These sources are often inaccessible. She explained how this can impede learning and frustrate students:

> Imagine someone reading three different articles to you and using those articles to write an essay and not being able to reference them, and not being able to see what your peers have written.

A number of TVIs shared that the inaccessibility of digital materials often requires them to teach students who are BVI additional computer skills that may not be "age-appropriate." These are computer skills that their peers are not yet learning. She explained:

> They claim it's accessible. But all I can try and equate it to, it's like operating in a DOS environment as opposed to Windows. When you're teaching a kid to use a screen reader, they have to use commands. A fully sighted kid can click and interact with a computer program. Here, you're asking a very young child to operate in an environment that is not age appropriate because they can't point a mouse and click. The publisher says it's accessible, but maybe it's not if their fingers don't reach the entire keyboard and then having to use commands instead of pointing and clicking. For younger kids, it's a huge cognitive leap to ask them to do things that their peers aren't doing. And now I have to teach them keyboarding in addition to the subject.

TVIs noted that students can download some of the digital material and access it on refreshable braille displays. This, however, is not possible with math. One TVI explained that refreshable braille is not suitable for math in part because the students learn best when the tactile graphic and the text are on the same page.

> I'd never give the math book on a device and the graphics on the side. For me an actual textbook, braille printed on paper, is the only way to go. I can see doing that for history book, but not math.

A college student echoed that digital math materials can be particularly problematic. She explained:

> If there's something like a graphic I have to have someone read it to me. So, math becomes a big problem because I don't have the material in front of me for math. The homework is online which means that I don't get access to graphics. I can't touch and feel the graphics, and my scribes that they hired, they're just students, they're not trained in this stuff… I'm a tactile learner, but they're basically having to describe. It can be a little difficult for someone to describe versus when I feel it. I'd rather have it in front of me so I can feel around and figure it out. I had to get used to learning a different way.

TVIs Need to Tailor Braille Materials for Students

Multiple TVIs underscored that learning materials need to be individualized for each braille-reading student. This happens more often for students who learn braille because of a progressive disease or injury than for children who are congenitally blind. One TVI explained:

> When students learn braille at an older age, they may not know enough of the braille code to read a textbook. Some of our students need support. The ones that are actively losing vision, they don't have great braille skills, can't see print, even with devices, [and are] not great listeners. They've lost their vision so quickly that they haven't had the back instruction that they need.

In these cases, TVIs create tailor-made braille materials to match the needs and abilities of the student. A TVI explained, "We have to produce [the textbook] for you. We scan it, format using software, and then we emboss it. So, we make the textbook ourselves." These tailored materials vary based on students' braille skills and individual needs. One TVI explained,

> There's contracted or uncontracted [braille]–everything needs to be so individualized. I'm here to modify your work to where you're at. When we're producing paper braille, we're going to modify it for how it fits the student. Some students need to skip a line. I'll produce it however they need it.

In summary, the amount of time it takes to individualize learning materials can result in students not receiving their materials at the same time as their sighted peers.

Classroom Teachers and Administrators May Inadvertently Cause Delays

During interviews, most TVIs shared that classroom teachers unknowingly cause delays in getting braille materials to students. This happens because classroom teachers sometimes do not give TVIs enough lead time to produce the material. Even if the textbook is brailled on time, teachers often create supplemental materials or teacher-made materials. One TVI explained:

> Teachers supplement textbooks a lot. There's handouts and homework, there's different articles to read and prompts to respond to. None of that comes out of the textbook.

This means that TVIs, paraeducators, and transcribers need to make these materials accessible to students. In some cases, teachers will *only* use teacher-made materials. One TVI shared, "Out of all of our math teachers, no one uses the math book. It's all handmade stuff. Then we're brailling everything."

TVIs also shared that they have to produce district-wide testing materials under significant time constraints because the testing materials are often not released until shortly before they are administered to students. One TVI explained that "…the tests aren't released until the week before." In this case, her five students who are BVI had to take a total of 22 midterms. She explained that she and her colleagues produced 172 graphics that her students needed to take the midterms. She explained that some took 15 minutes, and some took well over an hour.

“And we did that on the weekend, on Saturdays…we clocked a lot of hours to get those ready.”

Again, the amount of time it takes to produce learning and testing materials, coupled with short or no lead time, can result in students not receiving their materials at the same time as their sighted peers and/or TVIs dedicating a significant amount of time to producing materials. Indeed, when discussing the amount of time that it takes to produce tactile graphics, one TVI explained that “time gets in the way of making things equal.”

Transcription

In some cases, volunteers transcribe textbooks, given the lack of certified transcribers and the cost to transcribe printed materials. One TVI noted that math books “are a problem” because volunteers are often slower to transcribe than their paid counterparts. She explained that “sometimes the math books come in slow. I get one chapter at a time…,” and it may not be the chapter that the student needs.

Certified transcribers often produce textbook chapters in sequence. One TVI noted that this can present a problem for students because “this sequence may not be the sequence in which the teacher teaches the content.” She explained:

> Textbooks typically come piecemeal, three to four volumes at a time. But classrooms don’t work like that. Often, they’re starting at the back of the book. We’re starting at unit ten and then unit one comes in. So, then we say “Okay, we’re brailling unit ten. Let’s get the print book and braille it.”

Another TVI explained that because transcribers produce the entire braille book in sequence, students receive the front matter of a textbook (e.g., the copyright page, the introduction) first. She shared:

> I’d rather you send me Chapter One, rather than send me the [front matter]. Can you do that at the end? We need Chapter One right now…It’s hard to sit knowing that I have to send a student to class today that doesn’t have their textbooks.

TVIs explained that the relatively recent switch to the UEB code can also cause delays. One TVI shared that “there are not as many people who are comfortable doing it in UEB [math code] as they are in Nemeth.” Although students are permitted to use both codes, some students are more comfortable with UEB math. This means that TVIs who only learned Nemeth now need to learn UEB math. A teacher who is new to UEB will need more time to transcribe materials than if he or she were transcribing using the Nemeth code.

The use of two braille codes in math can also lead to miscommunications that can cause delays. One TVI shared that a transcriber had produced math material in UEB when it should have been in Nemeth. In this case, the TVI had to six-key [i.e., manually type in] the Nemeth code because “that’s a lot easier to do then to edit someone else’s UEB file.”

Parents and TVIs shared a number of recommendations for how braille can be improved to support student learning. (See Appendix B for these recommendations.)

New Adoptions

New adoptions that include new textbooks, as opposed to older editions, can mean that students will not receive materials at the same time as their sighted peers. This is due to the volume of text and images that need to be translated into accessible formats. One TVI explained that:

> New adoptions stink because its nowhere out there [already] produced in braille… sometimes we don't see the books until the end of the year. If the books are old editions, it's great because somewhere, someone has produced it in braille.

After new adoptions, TVIs shared that in some cases their students never received their learning materials. One TVI said that when new history books were adopted two years ago:

> I never had a volume when I needed it and into October of the *next* school year, I was still receiving volumes of that book. So, we brailled Civics and History.

This echoes a comment made by a college student. She remembered that when she was in high school, "sometimes books would come in at the end of the year when we didn't need them anymore."

Different Expectations Among Classroom Teachers and School Leaders

Comments from a number of TVIs suggest that in some settings, the learning expectations for students who are BVI are lower than those for their sighted peers. TVIs explained that this can create a climate of inequity. Specifically, when educators expect students who are BVI to learn less than their sighted peers, and by extension use less of a given educational material, late delivery of these materials becomes acceptable. One TVI explained how these different sets of expectations can lead to inequitable learning environments:

> Do we send a student into a classroom without print? Can you imagine what would happen if they [sighted students] didn't have access to worksheets, PowerPoints, posters on the wall, if we send children who can see into those classrooms and they were expected to learn just listening to someone. How would they master those concepts? We can't ever accept that blind children should go into any learning environment without accessible materials.

No NIMAS File

NIMAS is a source file format that is used by accessible media producers to produce

accessible formats for students. The NIMAC is the national source file repository for K-12 instructional materials. The NIMAC receives NIMAS files from educational publishers and makes these files available to states for use in the production of accessible formats for use by eligible students in elementary and secondary schools.

When a NIMAS file is not available for a book, the steps involved in creating an accessible format can cause significant delays. One TVI described the steps that she took to acquire a NIMAS-sourced accessible format when the NIMAS file was not already available in the NIMAC.

One of her students, a second grader, was using a digital textbook which was not fully accessible; the student could not navigate the book using a mouse like other students. The TVI explained, “Her colors are going, her vision is going very fast. She had to rely on someone helping her and it’s not 100% accessible. It’s like a PDF—all you gotta do is take the mouse and click, but if you can’t see the arrow, it’s not easy … for VI kids, their eyes get very tired, their eyes get fatigued.”

Because the student could not access the digital textbook being used by the rest of the class, the TVI asked FIMC-VI for help in acquiring an accessible format. FIMC-VI checked for the book on the NIMAC (the central repository for NIMAS files), and there was no NIMAS file. The TVI then searched Bookshare. The file was not available through Bookshare, either. She then contacted the publisher, but the publisher said they were not able to provide her with an accessible format or digital file. After the TVI contacted the publisher, FIMC-VI also contacted the publisher twice, once in writing, to remind them of their obligation under IDEA 2004 to provide accessible materials for students with print disabilities who have an IEP.

This back and forth took one month. After the publisher received the letter, they finally did submit a NIMAS file for the textbook. It took two months for the second grader to have the book in hand—when she was able to access the NIMAS-sourced DAISY file from Bookshare. As the TVI noted, “She got [the book] in December and the other kids got it the first week of school.”

The situation above underscores the challenges that arise when a NIMAS file is not available in the NIMAC, which can be due to a number of factors. In the case above, the textbook provided to the student was a digital edition. Because digital textbooks are currently not within scope for NIMAS, this may be why the publisher had not supplied a file to the NIMAC. However, it is also possible that the program included both print and digital textbooks--and so NIMAS could have been required in the contract--but the contract language did not include the NIMAS requirement. If the latter was the case, there would have been no trigger for the publisher to produce and submit the files, and technically, no legal obligation for them to do so after the fact, either.

Another TVI voiced frustration when sharing a similar example about receiving materials late because there was no NIMAS file. She explained, “Someone paid millions to purchase the

book, why am I waiting three months?"

Under IDEA 2004, the only mechanism to require that a publisher supply a NIMAS file to the NIMAC is the print book adoption contract or purchase agreement. For this reason, it is essential that states, districts, and even individual schools, ensure that NIMAS is required in the contract whenever they purchase new textbooks for students. When the NIMAC has to place a request to a publisher after a need is identified, it is not guaranteed that the file will be provided. It can also take one to three months for the publisher to create and submit NIMAS after the request is received. In sum, the most effective and efficient way to ensure that the NIMAC has the NIMAS file when the need arises is to include NIMAS language in the purchase contract. Guidance for procurement officials on how to include this language is provided by the National AEM Center at CAST: http://aem.cast.org/policies/local-purchase-order-contract-language.html

Interview and survey data from TVIs and NIMAC users suggest that NIMAS files and the NIMAC play a critical role in ensuring the timely delivery of high-quality braille. In the words of one NIMAC user with 34 years' experience in the AEM field: "…NIMAS really revolutionized the ability to do braille." She shared that after states were awarded grant money to purchase equipment to convert NIMAS files, things "went into orbit…we started getting higher quality files and we had a place to go to get them."

Before NIMAS, and in the early days of NIMAS, vendors used an optical content recognition (OCR) scanning process to extract text from PDFs and create a file that could be used in transcription software. One NIMAC user with 30+ years' experience in the AEM field explained that before NIMAS:

> We would cut the book and then scan the book. And back then OCR was horrific. It was faster to 6-key rather than work with some of those files. It was just a mess.

Another NIMAC user shared, "Before we were able to leverage digital files through [the NIMAC], many students who are BVI in our state went without textbooks and materials. Because of the NIMAC, things are much different here now."

In addition to braille, the NIMAS file format and the NIMAC revolutionized the production and provision of AEM for students with print disabilities. In the section that follows, we draw from interview and survey data with NIMAC users to describe the specific ways in which the NIMAC and the NIMAS file format help ensure the timely delivery of AEM for qualifying students with print disabilities.

Part II: How the NIMAC/NIMAS Contributes to the Timely Delivery of Accessible Formats

The NIMAC and NIMAS Background

Created by IDEA 2004, the NIMAC is the national source file repository for K-12 instructional materials. The NIMAC receives NIMAS files from educational publishers and makes these files available to states for use in the production of accessible formats for use by eligible students in elementary and secondary schools. The NIMAC's policies, procedures and online system also protect copyright. As a source file format, NIMAS is not designed to be distributed directly to students for use in the classroom. It requires conversion into a student-ready accessible format first. As a source file format, NIMAS is intended for use *only* in the production of accessible formats.

Under IDEA 2004, the only mechanism to require publishers to submit NIMAS files to the NIMAC is the customer's print book adoption contract or purchase agreement. In accordance with the legislation, State educational agencies (SEAs) and local educational agencies (LEAs) trigger the production of NIMAS files sets by including language requiring NIMAS in their procurement contracts. Publishers may also submit files voluntarily when they publish new textbooks, or in anticipation of a future adoption contract.

Because the NIMAS format is a special format that is not produced in the course of regular print book workflows, virtually all publishers contract with outside vendors to create NIMAS files once their print books have been finalized for use in the classroom. After the file sets are submitted by publishers to the NIMAC, the files go through a series of automated and manual quality checks. After files pass these quality checks, they are accepted into the system and available for download by designated users.

States are not required to work with the NIMAC; however, all 50 states, and the seven eligible outlying areas, have chosen to do so. Each SEA names a State Coordinator (SC) who is responsible for designating the Authorized Users (AUs) for the state. These AUs can directly download file sets from the repository if they are accessible media producers. They can also assign files for download to organizations or individuals who register independently with the NIMAC as Accessible Media Producers (AMPs). These AMPs can then download the assigned files and produce the accessible format on behalf of the state or AU. If State Coordinators also have a direct day-to-day role in producing accessible formats for students, they have the option of obtaining a dual account that provides access to both the State Coordinator and Authorized User system functions. These users are known as "Hybrid SC" account holders.

How the NIMAC/NIMAS Help Ensure the Timely Delivery of High-Quality AEM

Survey and interview data collected by EEC suggest that the NIMAC and the NIMAS file format play a critical role in ensuring that students with print disabilities can access high-quality AEM in a timely manner. Interview and survey data suggest that there are a number of ways that the NIMAC/NIMAS make accessible format production workflows more efficient. In the subsections below, we describe the specific ways in which the NIMAC and the NIMAS file format have contributed to the timely delivery of AEM.

Having a Central Repository for Files Saves Time

Interview and survey data suggest that having a central repository for NIMAS files saves time for NIMAC users because they can obtain files directly from the NIMAC, instead of taking the time to request files directly from publishers. Before the NIMAC, which began operations in December of 2006, educators and administrators responsible for providing AEM to students generally had to contact publishers directly whenever a source file was needed in order to produce accessible formats for students. According to interviewees, this process was neither straightforward nor quick. Because of this, NIMAC users who were in the field prior to 2007 experienced delays that could set back production by months; these delays were subsequently passed on to students. For the first time, IDEA 2004 provided a mechanism for all states to request files in advance of an identified need—as a part of the procurement process—so that the files would already be available in the NIMAC repository when needed.

One AU explained, “The NIMAC has helped tremendously because before we’d have to contact the publisher individually to get the files. To find the person to talk to was very difficult. A lot of times we couldn’t get it and we’d have to scan the book. And that took so much longer. [The NIMAC] really made things much easier to get a hold of the files that we need.” Similarly, when AU survey respondents were asked what about the NIIMAC/NIMAS makes it quicker and/or easier for you/your organization to provide accessible materials to students, two AUs shared that the NIMAC enables “typically immediate access to the files and minimal need to interact with publishers” and saves time by “not having to go directly to the publisher for files.”

Survey respondents (seven AUs, two Hybrid SCs and one AMP) described the time savings that access to a central file repository affords. Comments include that having “all the source materials located in a single site” and providing “real-time access to files” makes it possible to start production work sooner and deliver AEM to students faster than it was before the NIMAC was available. One AU described how the NIMAC cuts down on time to obtain a source file and produce AEM:

> A central repository is far superior in so many ways than the pre-2007 “Wild West" days of working with districts to try to find cooperative publishers and consulting with them on their own VERY time-consuming scanning efforts.

Further, data suggest that the sheer quantity of files that the NIMAC houses (currently 62,634 files) makes it quicker and/or easier than it was pre-2007 for AUs, Hybrid SCs and AMPs to provide accessible materials to students.

During an interview an AU explained how the quantity of files has a direct impact on what she is able to produce for her students. She noted, “just having the file has made things much easier. Some of these books that I’d never consider putting into braille, because of having to scan them, now, with the NIMAS file, I can do it.” Thus, more NIMAS titles mean that students who need AEM have a greater chance of getting the title they need.

In sum, data suggest that having central repository for NIMAS files—thereby reducing or eliminating the need for schools or AMPs to request files directly from publishers when a specific need arises—allows production to start sooner, speeds up the production of AEM and shortens the timeline for delivery of the accessible format to the student.

The NIMAC’s Website Resources Make Users’ Workflow More Efficient

Survey and interview data suggest that the NIMAC’s website resources support the efficient use of the NIMAC system among NIMAC users.

- In total, 83% of responding AMPs, AUs, Publishers, Vendors, Hybrid SCs, SCs (n = 84) agreed or strongly agreed that overall, NIMAC webinars have increased the efficiency with which they use the NIMAC system.

- 84% of responding AMPs, AUs, Publishers, Vendors, Hybrid SCs, SCs (n = 107) agreed or strongly agreed that overall, NIMAC’s website resources have increased the efficiency with which they use the NIMAC system.

This indicates that users are spending less time in the system than they would without accessing/utilizing website resources. In the case of publishers and conversion vendors, some of these users may dedicate the time savings to other areas of their NIMAS production workflows which may, in turn, increase the speed with which NIMAS files are made available to states and AMPs.

The extent to which website resources (e.g., guidance documents, FAQs, webinars) increase the efficient use of the NIMAC system may be influenced by the clarity of resource content.

- Indeed, across all 6 user groups, 88% (n = 98) reported that overall, the NIMAC’s website resources are easy to understand.

- 89% (n = 75) of users across all user groups reported that webinar presenters clearly communicate about the topic at hand.

User’s survey comments provide additional support for the quality and usefulness of the NIMAC’s website resources. One Hybrid SC shared:

> We really appreciate the NIMAC/NIMAS resources. Staff are always very helpful and quick to respond to requests. FAQ [documents] and recorded webinars are valuable resources for refresher courses and new staff.

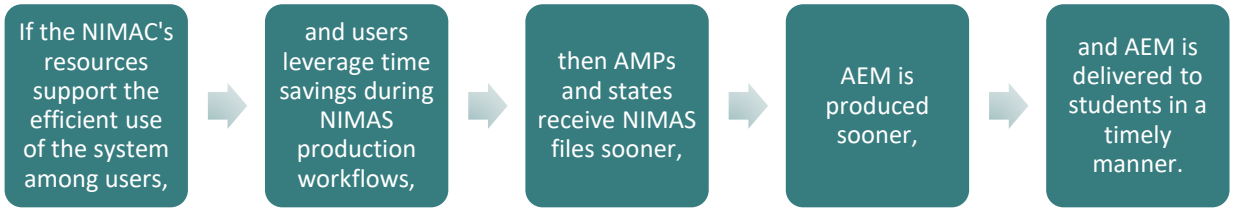
A publisher shared a similar experience:

> They have provided very well-structured documentation and I refer back to a lot of the materials. Over the years, they've provided excellent materials, I attend the trainings whenever I can, and it's always been very well done. If something changes on the site, they're always really good about updating the publishers and vendors.

In sum, data suggest that the NIMAC's website resources support the efficient use of the system among users. Time savings that are leveraged during NIMAS production workflows may, in turn, contribute to the timely production, and subsequent timely delivery, of AEM. If the assumptions below hold, then the NIMAC's website resources are one factor that contributes to the timely production, and subsequent timely delivery, of AEM.

Figure 9

How NIMAC's Website Resources Can Contribute to the Timely Delivery of AEM



The NIMAC's Technical Support Makes Users' Workflows More Efficient

Survey and interview data suggest that the NIMAC's technical support services may contribute to the timely production of AEM. Specifically, data indicate that the provision of timely, clear, and helpful technical support by the NIMAC to NIMAC users helps to resolve user issues rapidly. Rapid issue resolution may subsequently increase workflow speeds among NIMAC users.

Data suggest that NIMAC users overwhelmingly experience prompt technical support from the NIMAC staff.

- In total, 95% (n = 104) of responding AMPs, AUs, Publishers, Vendors, Hybrid SCs, SCs agreed or strongly agreed that overall, NIMAC's response to their request for assistance is timely.

- 97% (n = 56) of responding Publishers and Vendors agreed or strongly agreed that the NIMAC staff quickly responds to their initial requests and any follow up questions or concerns.

Data also suggest the NIMAC is able to provide clear and useful support that results in issue resolution.

- 97% (n = 57) of Publishers and Vendors agreed or strongly agreed that NIMAC staff were clear about changes they needed to make with regard to file certification.

- Across all user groups, 91% (n =100) reported that the assistance from the NIMAC staff has been useful.

- 70% (n = 19) of AMPs, AUs, and Hybrid SCs reported that staff were able to resolve an issue that they brought to the NIMAC or provide a workaround.

Interview data support these findings. For example, an AU shared that the NIMAC's technical support is timely and also saves him time by enabling him to move forward if the NIMAC staff are not able to resolve the issue because it is beyond their scope. He explained:

> [Staff member] is very, very helpful. She resolves—not just resolves—but resolves it really in a timely manner. And if there's something that they can't do, they let me know so then I'm not just sitting around waiting.

When asked about NIMAC's technical support, one vendor shared that NIMAC support is both helpful and timely; he shared that the staff are "fantastic." He explained that "whenever we have inquiries, they give super responses in a day." Another vendor had similar experiences with the NIMAC staff. He said, "not often, but sometimes the NIMAC contacts us after uploading. They are very clear with what you have do."

The majority of users (69%, n = 125) reported that they have never encountered a problem with a NIMAS file. Two users noted that their NIMAS files are typically "a clean matching publisher file formatted properly" and that they have "never really had any problems with NIMAS files." In total, 31% (n = 56) of users have encountered an issue with a NIMAS file. One user shared "A few times we have had incomplete files, but the NIMAS staff has ALWAYS helped our agency receive a complete file from the publisher/vendors."

According to the NIMAC Director, the NIMAC receives very few reports of quality problems with the file sets themselves. However, when a problem is identified in a file at the point of use, the NIMAC will investigate to verify the issue and then require the publisher to correct and resubmit the file. In cases where users encounter other issues in using the NIMAS file, such as software problems due to limited support for the NIMAS format, staff will try to provide a workaround whenever possible. (Two examples of this include providing assistance to users whose software is unable to work with MathML or does not support SVG images.)

Users reported that the NIMAC's workarounds have helped them resolve file issues. Of 181 respondents, 15% (n=27) indicated that when they had an issue with a file, they reported it to the NIMAC. Of these respondents, 70% (n = 19) agreed or strongly agreed that the NIMAC staff were able to resolve the problem or provide a workaround. Further, a publisher who has been in the AEM field for over 25 years reflected that "Over the years, the NIMAC staff have been, very helpful, very quick at responding. If there's ever been a delay, I'd venture to say it's been on my end."

Comments from survey takers provide further support for the quality and timeliness of NIMAC's technical support.

- AU: "I feel the NIMAC staff goes above and beyond to offer assistance and problem solve issues. They are always quick to reply. They provide excellent customer service."

- Vendor: "The NIMAC team has been outstanding to work with. I've worked on NIMAS files in the past but never had to deal directly with the NIMAC team until the last 10 months or so. They were extremely helpful in getting my account set-up, providing guidance for issues I wasn't aware of, reviewing sample files and providing useful feedback, and generally answering all of the questions a new user might have - and then some. They provide excellent customer support."

Data suggest that the "approachability" of NIMAC staff may make it more likely and/or easier for users to contact the NIMAC. Quotes that support staff's approachability follow:

- AU: "I'm pleasantly surprised how personal contact is at the NIMAC. They remembered my name at APH, followed up on questions, etc."

- Vendor: 'NIMAC team is always approachable and provides us guidance whenever required.'

- SC: "They get back to me quickly and I'm comfortable emailing and calling for support."

- Publisher: "Requested support information provided by [staff member] has been exceptional. She is consistently knowledgeable, responsive, and a pleasure to work with. She has been a wonderful resource with questions regarding meeting the accessibility needs of students and access needs of teachers."

Data indicate that the technical and customer support that the NIMAC provides has enabled at least one publisher to produce higher quality NIMAS files. This publisher, whose files account for 23% of the NIMAC's inventory, shared that the NIMAC's technical support has "resulted in a much better NIMAS file because it's more complete, it ensures that we're doing all of our QC [quality control] steps, and that we're ensuring that they're [NIMAC] getting something that they can certify quickly." Quicker certification means that AMPs can begin to work on producing AEM sooner.

The NIMAC also helped this publisher streamline his team's NIMAS production process by helping them standardize metadata. This change makes it easier for AUs, SCs, and Hybrid SCs to find files faster. When these users can locate files faster, they can assign them to AMPs sooner.

With regard to issues related to file certification, the NIMAC Director underscored that NIMAC staff strive to review all submitted files in a timely way and to provide clear, courteous and concise feedback to publishers and vendors if corrections are required in order for the NIMAC to accept a file into the repository. Indeed, 97% (n = 57) of publishers and vendors agreed or strongly agreed that NIMAC staff were clear about changes they needed to make with regard to file certification. The clarity with which needed changes are communicated by the NIMAC staff to publishers and vendors also likely increases the speed with which corrected files are submitted.

Data suggest that the NIMAC has also been responsive to a number of user-identified issues. Through survey comments, NIMAC users identified issues that they have encountered in the past when working in the system. The table below includes some of the issues mentioned by survey respondents and the actions that the NIMAC has either already taken, or plans to take, to address each one. Actions taken, and planned, by the NIMAC staff demonstrate responsiveness to users' requests, and a commitment to continuously improve the system to help make users' workflows more efficient.

Table 1

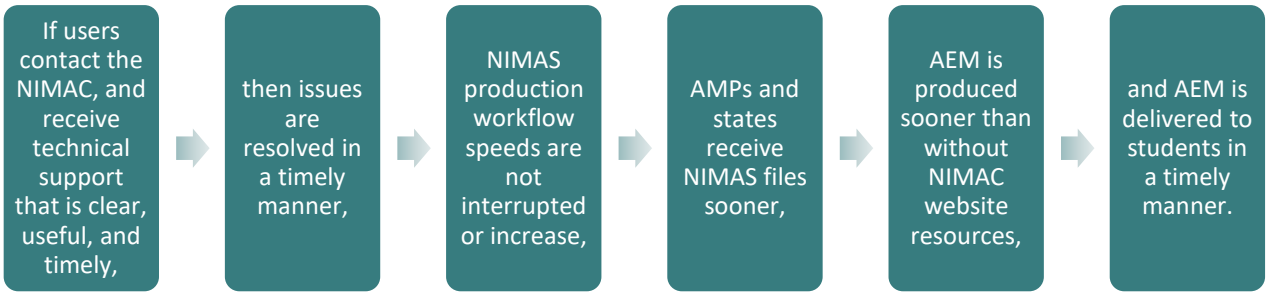
User Issues and NIMAC Actions

Issue	NIMAC action
The file submission/upload process for multiple files is complex.	As of November 18, 2019, Vendors can batch deliver files via FTP for files of any size, regardless of whether files are over 1 GB (this used to require DVD delivery for this size) or under 300 MB (this used to require direct system upload for these files).
The error reports for failed batch delivery do not always provide sufficient detail.	As of 2020, the NIMAC now provides greater detail in error reports. These reports offer more specificity around what caused a file to be rejected for upload.
Setting up AU accounts is too complicated.	The NIMAC's v3 system, released in 2017, significantly simplified and automated the user account creation process.
Files get stuck during download.	In 2017, the NIMAC's system vendor implemented entirely new download functionality which prevents downloads from hanging up or stalling. This should no longer be an issue for any user.
The lack of an annual inventory report for publishers.	In NIMAC v3, publishers can export a report of their inventory at any time.
AMPs need help requesting needed files/AUs don't always add materials to the Watchlist on their behalf.	The NIMAC is currently working to implement the Watchlist feature for the AMP portal. This will enable AMPs to request needed titles and have these titles researched and requested/expedited from the publishers.

In sum, data suggest that the NIMAC's technical support facilitates rapid issue resolution. Rapid resolution may, in turn, speed up (or not interrupt) production workflows and contribute to the timely production, and subsequent timely delivery of AEM. If the assumptions below hold, then the NIMAC's technical support is one factor that contributes to the timely production, and subsequent timely delivery, of AEM.

Figure 10

How NIMAC's Technical Support Can Contribute to the Timely Delivery of AEM



Revised System Functions/Features Increase the Speed with Which AEM Is Produced

In the spring of 2017, the NIMAC released a completely redesigned online system. Many changes were made to improve the system's functionality and user experience. Survey and interview data suggest that these new time-saving features may help ensure that students receive AEM in a timely manner.

AUs and Hybrid SCs were asked to report on whether a number of functions, introduced in 2017, improved the efficiency and ease of their workflow. Of 210 responses, 98% (n = 206) confirmed that the new functions improved the efficiency and ease of their workflow. Specifically, AU and Hybrid SC users reported that:

- The new search options/filters make it faster and easier to locate materials.
- Downloading is faster, more reliable, and easier.
- Users can use other system functions while waiting for downloading.
- The batch download option in the new system helps them do their work faster.

One Hybrid SC summed up how they thought the system improved with this comment: "More files available, easier search, faster downloading, quick assignment to AMPs."

The NIMAC also introduced a streamlined process designed to make creating and removing AUs faster and simpler. Hybrid SCs and SCs were asked to rate the extent to which they agreed

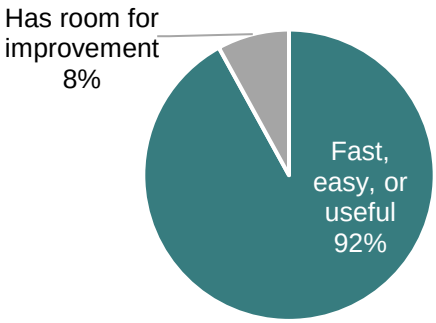
that creating and removing AU accounts in the new system is fast and easy. In total, 79% (n = 23) of responding Hybrid SCs and SCs agreed or strongly agreed that creating new AUs is fast and easy, and 81% (n = 21) agreed or strongly agreed that removing users is fast and easy.

The new system also gives SCs the option of accessing both the State Coordinator and Authorized User system functionality with a single login. Among the responding Hybrid SCs, 87% (n =15) agreed or strongly agreed that their hybrid account makes it more efficient for them to work in the NIMAC system; they can access the system faster with their hybrid account than they could with two separate accounts (one for SC and one for AU).

Survey respondents were also asked to report on whether they thought 16 system functions were fast, easy, useful and/or had room for improvement. In total, 806 respondents across five NIMAC user groups (AMPs, AUs, Hybrid SCs, Publishers, Vendors) offered 1,357 ratings. (There are more ratings than respondents because users could select each rating that applied.) Of the 1,357 ratings, 92% (n = 1253) were “fast”, “easy” or “useful,” and 8% (n=104) were “Has room for improvement.” See Appendix D for a chart that details how users rated each function.

Figure 11

NIMAC User Ratings Across System Functions



NIMAC users provided more specific feedback on a number of these system functions and the extent to which they save time during their AEM workflow. This feedback is detailed in the sections below.

Automated Batch Processing of File Deliveries Increases the Efficiency of File Certification

In May of 2018, the NIMAC streamlined its FTP batch delivery workflow to automate all aspects of the validation, metadata extraction and upload process. The new process has helped eliminate nearly all possible procedural errors related to batch delivery of files. Publishers or vendors only have to supply their files to the FTP, and the automated process handles the rest of the upload and metadata record creation process. According to the NIMAC Director, this

offers publishers a simpler workflow for batch delivery and file upload. It provides extensive improvements throughout the process, from communication with vendors and publishers, to FTP delivery procedures, to the ingestion of the files into the system and creation of system records.

By introducing greater automation of the batch processing, the NIMAC has been able to expedite the speed with which publishers and vendors can upload files, and in turn, increase the efficiency of file certification. The faster a file is certified, the sooner it's available to states and AMPs.

Vendors and publishers that deliver files to the NIMAC using the FTP batch delivery process reported that this process makes their workflow more efficient. There were four workflow improvements implemented into this process designed to expedite file delivery, processing and upload (e.g., automated metadata extraction). 96% (n = 132) of responding vendors and publishers reported that these four changes have made their workflows more efficient.

Survey comments from vendors underscore the extent to which the new process expedites file delivery. One vendor shared that "the new procedure is very easy and an excellent approach," and another shared that "the new and improved FTP delivery is very useful and efficient." Another vendor noted that another recent change, which now allows files over 1GB to be supplied by FTP, has also helped simplify their file delivery. (Previously, files over 1 GB in size each had to be delivered to OverDrive on DVD for processing.)

The extent to which the FTP delivery method is reliable and connectivity is not interrupted during file transfer likely also contributes to the efficiency with which files are delivered. Indeed, 97% (n = 31) of responding vendors and publishers reported that the FTP delivery method is reliable, and connectivity is not interrupted during file transfer.

In sum, data suggest that the improved batch processing workflow now offered by the NIMAC expedites the availability of files in the repository, compared to the earlier workflow. If files can be delivered more quickly by publishers and vendors, they can be made available to users sooner for use in producing accessible formats.

The Watchlist Research and Expedite Service Makes Workflows More Efficient

In 2018, the NIMAC began offering a new service to Authorized Users in order to help them obtain needed materials that were not yet available in the NIMAC. The Watchlist Research and Expedite service allows Authorized Users to add any ISBN that they do not find in the NIMAC to a Watchlist in their user account. NIMAC staff will research these ISBNs and, when materials are within scope for the repository, request that the publisher expedite the NIMAS file to the repository. Interview data suggest that the Watchlist helps expedite the production of accessible formats, so that materials can get into the hands of students faster.

Before the new Watchlist service became available, users would sometimes contact publishers if they needed to expedite the conversion of a given file. One AU explained that now, "NIMAC will contact the publisher, and that's a pretty quick process." A Hybrid SC noted that the Watchlist service has made acquiring needed files much faster than in the past. An AU survey respondent also explained that they had been using this service for six months and have found it to be "extremely helpful."

Survey respondents also reported on the utility of the Watchlist. In total 88% of AUs and Hybrid SCs (n = 24) reported that the Watchlist service helps them obtain needed files faster. Further, 75% of Hybrid SCs (n = 3) reported that the Watchlist service makes it quicker for me/my state to provide accessible materials to students. It should be noted that only 22% (n = 4) of all Hybrid SCs survey respondents reported having ever used the Watchlist service.

In sum, data suggest that the Watchlist service enables AUs and Hybrid SCs to obtain needed files faster and assign them to AMPs sooner than they were able to before the NIMAC began offering this service. This is noteworthy given that, as noted above, the sooner the file is available in the system, the sooner production into the accessible format can begin.

The Ability to Assign Files to AMPs Makes Workflows More Efficient

The NIMAC system allows AUs and Hybrid SCs to assign NIMAS files to AMPs for download. This functionality has always been available in the NIMAC system and allows Authorized Users in each state to assign files for download to any number of AMPs with whom they work. Because AMPs can then log into their own accounts and download the files, AUs do not have to download the files themselves and then burn them to DVD or deliver them to the AMP in some other way. The AMP file assignment functionality thus saves users time. Users offered evidence of these time savings in interview and survey data.

When asked to rate if assigning files was fast, easy, useful, or had room for improvement, 97% of all ratings, offered by 69 AUs and Hybrid SCs, were either "fast", "easy to use," and/or "useful." Lastly,100% (n = 21) of AUs and Hybrid SCs reported that the batch assign to AMP option (which allows the AU to assign multiple files at one time to an AMP) helps them do their work faster.

In survey comments, one AMP, two AUs and two Hybrid SCs explained why the AMP assignment feature makes it quicker and/or more likely than it was pre-2007 for them/their state to provide accessible materials to students. For example, a Hybrid SC shared that, "The ability to assign files directly to APH for conversion has increased [the system's] usability to LEAs." Further, during an interview a Hybrid SC shared, "I assign files to all our transcribers. All our transcribers have access to the database. They go in there and download, and they have their file. That's a lot more efficient than me having to download the file and then share with the transcriber." In sum, data suggest that the ability to assign files directly to AMPs is more efficient than the system would be if files had to be delivered to AMPs in some other way.

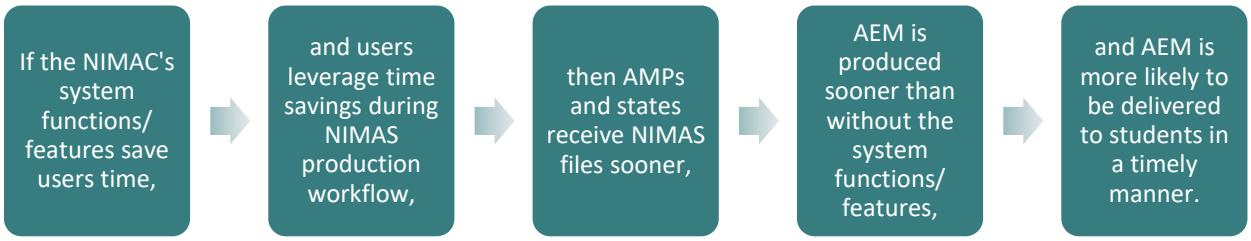
The Ease of Working in the System Makes Workflows More Efficient

Survey data suggest that the NIMAC/NIMAS have made it easier for AMPs and their organizations to produce AEM. Indeed, 81% (n = 43) of AMPs agreed that the NIMAC/NIMAS increase the ease with which they produce AEM. A number of interviewees also indicated that the system overall, and individual functions were easy to use. A transcriber and a vendor shared that the files are “quick” and “very easy” to download. These comments were echoed by an AMP who shared that “it doesn’t take a rocket scientist to click on the box and download.” Reflecting on their overall experience in the NIMAC system, one vendor shared that “the whole process is easy” and a publisher shared that “the system is super easy to use.”

In sum, data suggest that the functionality provided in the NIMAC v3 system increases the speed and ease of users’ workflow, which in turn may contribute to the timely production, and subsequent timely delivery, of AEM. If the assumptions below hold, then the NIMAC v3 system is one factor that contributes to the timely production, and subsequent timely delivery, of AEM.

Figure 12

How the NIMAC’s v3 System Can Contribute to the Timely Delivery of AEM



The NIMAS File Format Makes Workflows More Efficient

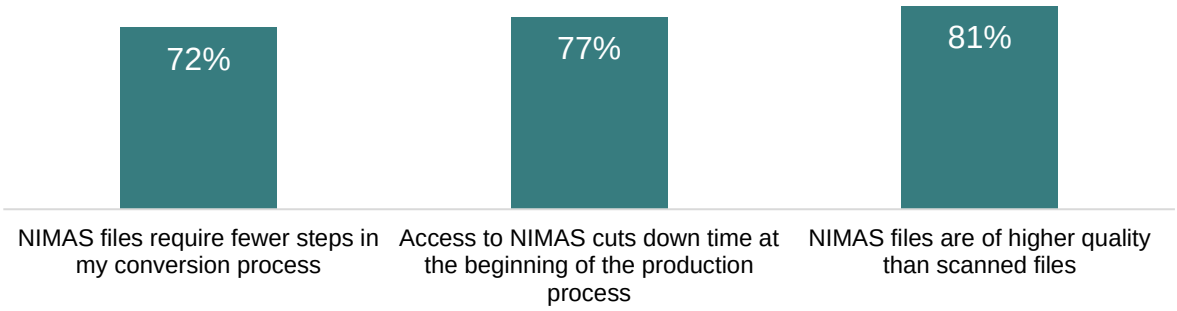
This section explores the extent to which the NIMAC system and NIMAS file format increase the speed with which AMPs produce AEM once they have a certified file in hand.

Interview and survey data suggest that the NIMAC/NIMAS increase the speed, relative to the time period before 2007 (the year most states began implementing NIMAS), with which AMPs are able to produce AEM. Specifically, 81% of responding AMPs (n = 52) agreed or strongly agreed that the NIMAC/NIMAS make it quicker for them/their organization to produce accessible materials to students than it was before 2007.

AMPs were asked to indicate which 3 features of the NIMAS file format make it quicker and/or easier than it was pre-2007 for them/their organization to provide AEM to students. The chart below shows the percentage of AMPs (n = 47) who reported that a given factor makes it quicker and/or easier to provide AEM to students.

Figure 13

NIMAS Features that Make it Quicker and/or Easier to Provide AEM to Students



Further, survey data also suggest that the NIMAC/NIMAS increase the speed relative to the time period before 2007 with which AUs, SCs, and Hybrid SCs are able to provide AEM to students:

- 88% of responding AUs and Hybrid SCs (n = 74) agreed or strongly agreed that the NIMAC/NIMAS make it quicker for them/their state to provide AEM to students than it was before 2007.

Below, we include survey comments that offer more detail about why the NIMAC/NIMAS, and the NIMAS file format more specifically, make it quicker and/or easier than it was pre-2007 for them/their organization to provide accessible materials to students.

Interview data suggest that "with a properly formatted NIMAS file, [AMPs] can expedite a project." As one AMP shared, "it's quite a bit more labor intensive without a NIMAS file." A braille transcriber explained why:

> NIMAS files are definitely a lot better than scanning. There is a big difference because a lot of times if it doesn't scan up to print, if a lot of things are in italics, it doesn't scan well at all, there's a lot of spelling errors and a lot of times scanning will miss punctuation. It's always a plus when you have the NIMAS file. You download the file and you just deal with formatting instead of punctuation and spelling. The NIMAS has really helped with getting books out. I think it's helped tremendously. It would be a slow process if we didn't have the NIMAS file format.

An AMP who has worked in the AEM field for over 30 years shared that once NIMAS files were made available, it took "a good 50% less time" to transcribe titles. This comment is significant because this AMP is responsible for producing hundreds of hard-copy braille books each year. Before the NIMAC/NIMAS, her organization produced approximately four titles a year; now they produce hundreds. In sum, because the NIMAS file format enables swifter production of AEM, it also enables AMPs to produce greater quantities of AEM.

When discussing braille production, one AMP shared that the NIMAS file makes it "possible to accurately divide the whole book into volumes early on, which makes it easier to share the book among several transcribers to get it done more quickly and efficiently." Further, a Hybrid SC explained that the NIMAS file speeds up the braille production process significantly. She explained:

> I pull the file into Braille 2000 and BrailleBlaster and I get a file that's 80% done, and then I can clean it up. It makes life a lot easier and saves time. You're getting things in students' hands at the same time as his peers, not two months behind.

Similarly, two AMPs also noted that a combination of software and the NIMAS file format can afford time savings in the production process. One AMP shared:

> The ability to bring an entire book into Braille 2000 and set headings, etc., quickly and efficiently and then proofread the whole thing and divide it into volumes much more quickly and easily than was ever possible when we had to input everything ourselves.

The NIMAS XML File Format Increases the Speed with Which AEM Is Produced

According to one AU, the availability of the book in the NIMAS format is "really the biggest variable in the equation for how long it takes to produce accessible materials." Indeed, 23 survey respondents shared comments indicating that the NIMAS format makes it quicker and/or easier for AUs, Hybrid SCs and AMPs to provide accessible materials to students. Eight of these respondents also shared that the standard XML file format increases the speed with which AEM is produced. One AMP referred to the NIMAS files as "publisher quality files," that make it possible to "more efficiently" format files. AMPs ability to more efficiently format the file is important because it reduces production time and can increase the speed with which AEM is delivered to students. The following quotations represent the major points made in survey comments:

> AMP: "Less spelling errors, being able to recognize punctuation marks, without throwing a lot of garbage in the file, adding page numbers and running heads in the proper place, it has definitely been a dramatic change since its humble beginnings."

> AU: "We went from scanning and OCR texts (which is still done for some books) to full NIMAS XML import in InDesign. This has allowed for virtually typo-free text, linked images for easier [reflowing of the large print text] and easier style application…."

> AU: "NIMAS files are easy to download and convert. I can then email the converted file for a transcriber to begin production in a day or two. Love it."

NIMAS Saves Significant Time by Bypassing Scanning

When AMPs don't have access to a digital file format, they often need to rely on scanning the textbook in order to produce a digital file that can be converted into AEM. Interviewees emphasized that scanning a book can take a significant amount of time and make timely delivery of AEM to students challenging. One AMP shared that, "If it's a book hasn't been done [in NIMAS], we have to scan it. We need a substantial amount of time because it's not just Amazon, you can't go and just take it off the shelf." Another noted that when a textbook doesn't have a NIMAS file, the scanning "takes away time from one of my braillists who could otherwise be brailling."

Fourteen survey comments indicate that bypassing scanning makes it quicker and/or easier for AUs, Hybrid SCs and AMPs to provide accessible materials to students. One AMP shared that the electronic format "improves the speed and accuracy of producing braille tremendously." An AU agreed, noting that "prior to having readily available NIMAS format files, much had to be done by hand and much had to be left undone due to lack of resources."

Lastly, one AU shared that "It's much faster to produce braille when you can start with an accurate electronic file rather than having to scan and OCR textbooks, which is labor intensive." This is summed up by a comment from one AMP: "no scanning, zoning, OCR'ing … this saves weeks!!!"

Availability of NIMAS files may also increase the pool of AMPs to which AUs and Hybrid SCs can assign files. One AU explained that "many transcribers will only take [braille orders for] books that have an electronic file" because they don't want to take the time to scan books. Thus, when NIMAS is available, the potential pool of AMPs for AUs to choose from likely increases. This is can be especially important when there is a shortage of available transcribers in a given region or for specific types of materials. Indeed, five NIMAC users shared that one of the biggest obstacles to providing AEM to students was finding certified transcribers. One SC reported that it was difficult to "find three quotes of equal value" from AMPs. In sum, being able to assign digital files to AMPs may increase the pool of producers from which Hybrid SCs and AUs can choose.

The NIMAS File Format Leads to Higher Quality AEM for Students

Data suggest that the NIMAS file format specification helps ensure that AMPs have what they need to produce AEM that is equivalent to the print book. One AMP explained that "when you have a NIMAS file you're always going to come out with a cleaner translation because it's a replica of what the publisher has in the book." This "cleaner translation" may give rise to higher quality AEM.

One AU noted that the NIMAS files "seem to get cleaner and more efficient with each year." One Hybrid SC shared that when the NIMAC was first operational, publishers "didn't know how to make [NIMAS files]. Now they know what they are and how to make them and how to get

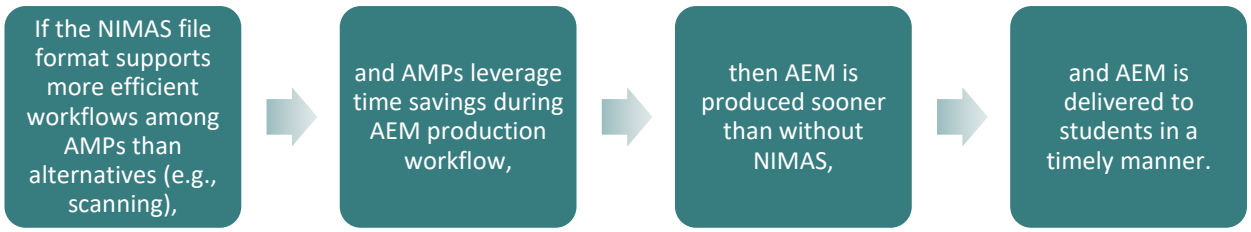
them to you; and then we know how to download and then manipulate the file." She also noted that even though the first NIMAS files "were not like the ones we have now," she emphasized that using those files was "still better than scanning."

The accuracy of NIMAS files was also noted by a number of Florida TVIs. Additionally, 73% of responding AMPs (n = 55) agreed that because of the NIMAS file format, they/their company can produce higher quality accessible materials than they could before 2007. Further, among AU and Hybrid SC respondents, 84% (n = 63) agreed that the NIMAC/NIMAS make it more likely for them/their state to provide high-quality accessible materials to students than it was before 2007.

In sum, data suggest that the NIMAS file format increases AMP workflow speeds, which in turn may contribute to the timely production, and subsequent timely delivery of AEM. If the assumptions below hold, then the NIMAS file format is one factor that contributes to the timely production and delivery of high-quality AEM.

Figure 14

How the NIMAS File Format Can Contribute to the Timely Delivery of AEM



Prison Braille Programs and Bookshare: Special Providers Noted by Respondents

Data suggest that prison braille programs and Bookshare are AMPs that are particularly important in helping states meet students' needs for accessible formats. Prison braille programs generally provide embossed braille, tactile graphics, large print, and sometimes also digital formats. State agencies—and also the American Printing House for the Blind—rely on prison braille programs as providers of high-quality accessible media production services. Bookshare, a national AMP which is federally funded to convert and distribute accessible digital formats fpurviproduced from NIMAS, provides a range of digital formats that can be downloaded from their website for use by eligible students.

Prison Braille Programs

During an interview, one AMP shared that prison braille programs make a "huge difference" with regard to transcribing files. She stated that these programs offer "incredible value" for a number of reasons. They have a large workforce: the average program has between 25-50 certified transcribers; one state's prison program has almost 100 transcribers. The size of this workforce,

and the fact that transcribers work closely together, means that they can receive multiple projects at once and produce consistent, high-quality work. Their services can be particularly helpful, for example, when transcribing a math book with hundreds of tactile graphics. She explained, “My money goes further with prison programs. They’re able to handle more work, they’re more consistent, they’re high quality, and they’re not calling in sick.”

NIMAS and Bookshare

NIMAC users and TVIs underscored the important role that Bookshare plays in ensuring the timely delivery of AEM. One AMP explained that “direct access to NIMAS-derived Bookshare files allows students to access the book in the format they need.” This was echoed by an AMP who shared that “files go directly on student devices for more timely access.” A Hybrid SC also noted that “the selection and the amount of titles that Bookshare has is a huge plus.”

Bookshare also gives students who are BVI an accessible option when they’re waiting for embossed braille books. A Hybrid SC explained that when files are not in the NIMAC, she’ll place the files on the Watchlist. When the files are received by the NIMAC, she assigns files to Bookshare while the hard-copy braille is being produced. Bookshare can create a digital file for the student to use in the meantime. She shared, “I want my kids to have something,” and a DAISY file that a student can listen to is better than not having any AEM. Further, she shared that Bookshare’s turnaround time has improved significantly over time with regard to making requested NIMAS-sourced formats available on their site; instead of waiting for seven days to get a notification that her file is ready, she can now get that notification in one day.

Another AU explained:

> We rely heavily on Bookshare to provide digital books for use on iPads for our low vision students and also, for literary books, for blind readers in conjunction with a braille display. Without NIMAS files, Bookshare would take months rather than days to [scan and produce] the files and make them available to our students.

During interviews in Florida, four TVIs shared what they liked and what they found challenging about Bookshare. TVIs who completed the Florida TVI survey also shared their Bookshare likes and challenges. A full list of likes and challenges, along with supporting quotes, can be found in Appendix E.

Issues that Hinder the Timely Delivery of AEM

NIMAC users identified a number of issues that hinder the timely delivery of AEM. Addressing these issues would likely support the timely delivery of AEM. Although almost all of these issues are outside the purview of the NIMAC, and some require follow-up with NIMAC users to further clarify the nature and extent of a given issue, we include them to guide: 1) future exploration into the factors that hinder the timely delivery of AEM and 2) the development of strategies that can

mitigate these factors. Interview and survey data indicate that the following issues hinder the timely delivery of AEM:

- The lack of awareness/understanding about AEM production timelines across stakeholder groups.
- Late requests for materials.
- A file is not available in the NIMAC because the instructional materials are outside the scope of NIMAS:
    - Pre-NIMAS (before 2006) titles/editions
    - Teacher-made materials
    - Born digital material
    - Open Educational Resources (OERs)
- Hard copy textbooks are not provided/available to the AMP when needed for use in accessible format production.
- Users encounter challenges due to the variability of XML tagging in NIMAS files.
- Users encounter challenges when working with images.
- Users encounter challenges when producing math and science AEM.
- The lack of certified braille transcribers.
- The lack of software that is compatible with NIMAS.
- The need for additional NIMAC resources/training including professional development opportunities.

We explore some of these issues in detail in the sub-sections that follow.

The Lack of Awareness/Understanding about AEM Production Timelines across Stakeholder Groups

Survey and interview data from NIMAC users and TVIs indicate that a number of stakeholder groups are not aware of, or do not fully understand, the AEM production process and their role/responsibility in this process.

One AU shared:

> Decision-makers are not familiar with the unique systems and tools related to serving students with visual impairments. In general, accessibility is not a priority for the school districts. Requests and concerns regarding students with visual impairments are often set aside or dismissed. Parents are not as informed as they could be about their students' rights and ways to advocate for their students.

TVIs and NIMAC users also agreed that there is often a lack of understanding among educators and administrators with regard to:

- The importance of AEM: One Hybrid SC shared that it would be helpful if educators understood “the value and importance of accessibility.”
- The lead time needed to ensure that AEM is provided to students in a timely manner: One TVI shared, “I'm trying to help the school understand the timeframe needed to create materials and that we need consistency so that the materials are available for our VI students. I'm constantly creating materials.”
- Their legal obligations under IDEA 2004.
- The importance of including NIMAS language in procurement contracts.
- Which students qualify for NIMAS-sourced materials
- The degree to which digital materials are accessible to all students: One TVI shared, "when the district chooses digital textbooks or uses applications such as Nearpod and Kahoot they do not consider the need for students' accessibility."
- Who is responsible for ordering and producing AEM: One TVI shared, “People don’t know who’s responsible for what. It’s like wait, you have no idea, FIMC is not brailing for me, they’re seeking it when I put the request in—they’re trying to find it wherever this book is.”

This lack of understanding can result in late requests from classroom teachers for AEM. This is described in detail below.

Late Requests for Materials

One of the most commonly cited challenges to providing AEM to students, cited by both NIMAC users with respect to AEM more generally and TVIs with respect to braille, is receiving late requests for AEM from teachers. According to survey respondents and interviewees, late requests tend to happen because:

- “Teachers change their mind” about what material they are going to use.
- Teachers create their own teacher-made materials which may only be available a few days or a few hours before the class.
- Testing materials are released only a short time before tests are administered.

With regard to braille, both TVIs and NIMAC users shared that embossed braille books are usually created in chapter order. However, this may not be the sequence in which the teacher teaches the content. An AMP shared that some teachers only use selected content from a textbook (e.g., chapters 5-7), but the entire textbook is brailled for the student. One Hybrid SC who used to work in the warehouse of an instructional materials center recalled that “time after time I saw volumes of books that weren’t even opened. There’d be a $25,000 book and the student may have used one volume.” In his current role as a Hybrid SC, he created a pacing guide that “helps get the students what they need and makes the teachers accountable so they

don’t ask for things they don’t need.” He asks all teachers who need materials to complete the pacing guide which indicates what portions of a textbook they will use and when. He shared that the pacing guide “tells me how many chapters they are actually covering and when student is expected to have material in hand.”

Pre-NIMAS Titles/Editions

Under IDEA 2004, states and districts could begin requiring NIMAS in their textbook contracts in July of 2006. However, NIMAS was not retroactive for materials already being used in schools at that time. Over time, fewer and fewer districts utilize materials that were published before NIMAS went into effect. However, some districts do continue to rely on older textbooks. When NIMAS is not available for these older editions, this can delay the production of AEM. One AU and a TVI shared that in some cases, NIMAS is not available because, “Some schools are using textbooks that have been obsolete for years and years.”

Teacher-Made Materials

A common challenge to providing AEM to students in a timely manner, cited by both NIMAC users with respect to AEM more generally and TVIs with respect to braille, was the use of teacher-created instructional materials. These unpublished materials are not available in the NIMAC. Unless teachers prepare the materials in a format that is accessible or can be produced in accessible formats, AMPs, TVIs, and paraeducators may spend a considerable amount of time scanning and making the materials accessible. An AU explained:

> Over the past several years, we have seen a huge increase in the number of handout-type requests (this includes everything from teacher-made/online materials, information in PowerPoint format, photocopied portions of books, etc.)—and of course, these materials are not available in the NIMAC. At the same time, there has been a decrease in actual textbooks requested. The result is that, instead of using NIMAS files, we're having to go back to the less efficient scanning/clean-up method for more and more requests.

Born Digital Materials

With respect to AEM more generally, AUs, AMPs, Hybrid SCs shared that the move away from traditional textbooks to online materials, or materials that are “born digital,” has created conditions in which core materials are “very often not accessible for students.” One AU explained that digital materials that tend not to be accessible include documents that teachers place into learning management systems and high stakes statewide assessments. With respect to braille, one TVI shared, "most web-based textbooks are not accessible. Especially the ones that are interactive." A Hybrid SC underscored the importance of accessible digital materials and also indicated that there was light at the end of the tunnel with regard to digital material accessibility. “Ideally, all electronic materials publishers produce would be accessible (and it's slowly moving in that direction) so nothing ‘special’ is required.”

The NIMAC had previously been unable to accept files for born digital instructional materials, due to the definitions provided in IDEA 2004. However, after a long process working in collaboration with the U.S. Department of Education, Office of Special Education Programs (OSEP) and other stakeholders, the NIMAC anticipates that a Notice of Interpretation will soon be published that removes this barrier.

Open Educational Resources [OERs]

Another category of material that is not currently received by the NIMAC is OERs. These are materials that are made freely available by the content owners and as such, customers do not require NIMAS for the content through a purchase agreement or adoption contract. While the NIMAC welcomes OER producers to submit materials, they are not generally under any legal obligation to do so.

No Hard-Copy Textbooks for Use in Accessible Format Production

TVIs, AUs and AMPs reported that a print version of materials is often necessary during the production process for use in formatting the layout of the accessible book, and to proofread after the conversion is completed. This is especially important for textbooks, as the life of a textbook can involve a large number of printings. While some printings may involve only minor corrections, some publishers may incorporate significant changes between printings. Publishers do not supply NIMAS files for multiple printings of books. In cases where the NIMAS file is for a different printing than the hard copy being used in the school, it can be time-consuming for AMPs to proofread to ensure they capture any differences. One AU explained that:

> We often find that the files are different from the print copy—the differences range from minor to major. As a result, our transcribers spend a lot of time searching/proofing for differences.

An AMP shared that “some of the schools I transcribe for don't have the physical book available right away and I need the actual book to start transcribing.” An AU explained that they often do not receive print copies because “most schools don't understand why they need to send in a print copy if the NIMAS files are available.” Hard copy books are also important in assisting with the production of tactile graphics. One AMP did share, however, that when a print version is not available, her team can look at the image files in the NIMAS file and sometimes “use the outlines from those images so they don’t have to start from the ground floor.”

Variable XML Tagging in NIMAS Files

NIMAC users and TVIs reported that NIMAS files are often “structured differently,” and this can make some files more challenging to use. One Hybrid SC shared that, “Some are better than others. You never know what you are going to get.”

This technical issue with NIMAS is particularly challenging to address. There is no automated process that can detect how accurately a publisher has tagged specific print book content in the XML, and the specification itself provides for some flexibility in how some content can be represented. To further complicate matters, coding that may present a problem in the production of one format may pose no issues, or actually be preferable, in the production of another. While a certain amount of variability in XML tagging decisions is unavoidable, the NIMAC is always interested in receiving feedback on issues, so that these can be explored and, in cases where vendors are not following best practices, further guidance can be provided.

Users Encounter Challenges When Working with Images

Some users indicated a challenge working with images in NIMAS files. This may be because some users do not have software that supports the SVG format. To address this issue the NIMAC will soon be offering a new service to run a batch conversion to change SVG images into PNG format. This will allow users to get the most out of software that does not fully support working with NIMAS.

Users Encounter Challenges When Producing Math and Science AEM

With respect to braille, a number of TVIs and NIMAC users reported having difficulty producing math. As underscored by TVIs during interviews, students who are BVI often need math textbooks that are hard copy braille, which include tactile graphics. A number of variables can cause delays in the production of braille math textbooks, including:

1. Needing to produce hundreds of tactile graphics.
2. The existence of two different recognized braille math codes (Nemeth and UEB math).
3. A lack of certified transcribers in general, and a lack of math transcribers more specifically.

NIMAC users and TVIs in Florida also shared a number of suggestions for how to improve various types of AEM. Please see Appendix B and C for a list of these suggestions.

The Lack of Certified Braille Transcribers

TVIs and four NIMAC users reported that there is a lack of certified transcribers. In at least one case, a NIMAC user who faced challenges is starting a program called "AMP Up for Braille" to jumpstart a network of braille transcribers.

The Lack of Software That Is Compatible with NIMAS

With regard to AEM more generally, some AMPs, AUs and Hybrid SCs shared that there seem to be “very few programs that open NIMAS.” With respect to braille, some braille translation software cannot work with MathML. To help address this issue, the NIMAC implemented a new

“No MathML” download option in the system. This provides individuals whose software can’t work with MathML the option to request the system to strip out the MathML at the point of download. This enables the user to access the math equation images provided in the file set, as if MathML had not ever been present in the file.

A number of TVIs and NIMAC users also reported success with APH’s BrailleBlaster translation software. One AMP shared that when transcribers don’t want to take the time to learn BrailleBlaster, “they’ll take the NIMAS file and open it up in BrailleBlaster and it automatically formats the file. Then they’ll save it and work on it in Duxbury.”

The Need for Additional NIMAC Resources/Training

A number of NIMAC users indicated a need for additional resources from the NIMAC. These are listed below.

- **Prison program DVDs/CDs**: An AU at a prison program shared that it would be helpful to have DVD's/CD's instructional videos, as internet access for accessing the NIMAC’s website resources is limited.

- **Refresher videos:** Some NIMAC users who do not routinely access the system shared that they sometimes forget how to search and download files. Refresher videos would be helpful.

- **Instructional videos for publishers:** One SC shared that, prior to purchase, they would like to be able to share with publishers training videos that provide instructions on how to submit/convert NIMAS file sets.

The Need for Professional Development Opportunities

A number of NIMAC users also expressed an interested in professional training.

- **Training/resources on how to work with NIMAS files:** Three NIMAC users shared that additional training for how to work with NIMAS files would be helpful. One publisher stated that “real-world information on how NIMAS files can actually be used (or used efficiently)” would be helpful. Another publisher shared that that while “NIMAS tagging guides and exemplar models are available (CAST and others),” there is a “big gap between accomplishing the structural model and using it for publishing.” Lastly, one AU reported that they have experienced a lack of training on how to use a NIMAS file to produce AEM. They explained:

  I came into this job a few months ago. I'm a certified braille transcriber but had never been given textbooks. Regardless of translation software, I have no instructions of where to begin. I contacted APH, NBA, NBP, etc. and they realize that there is a ‘hole’ in their

transcriber training. I'm starting to panic as we are preparing for the 2020-21 school year and I still don't know the steps to take to make a usable embossed copy.

Concluding Remarks

Interview and survey data suggest that the NIMAC, in combination with the NIMAS file format, and other facilitating conditions listed above, have made it more likely that students receive AEM in a timely manner than before 2007. For example, one national braille provider described how the NIMAC/NIMAS reduced by at least half the production time and cost of producing braille. This AMP shared that 20 years ago it took a year and a half to transcribe a 92-volume math textbook, and it cost approximately $142,000 to transcribe only (this cost is in today's dollars and did not include embossing). She explained that now, "we can get the entire book in six to eight months and pay around $30-$40,000." This represents a savings of over 60%. This AMP also shared that the NIMAC/NIMAS are "light years ahead from where we were 20 years ago. Even the past five years we've made significant progress."

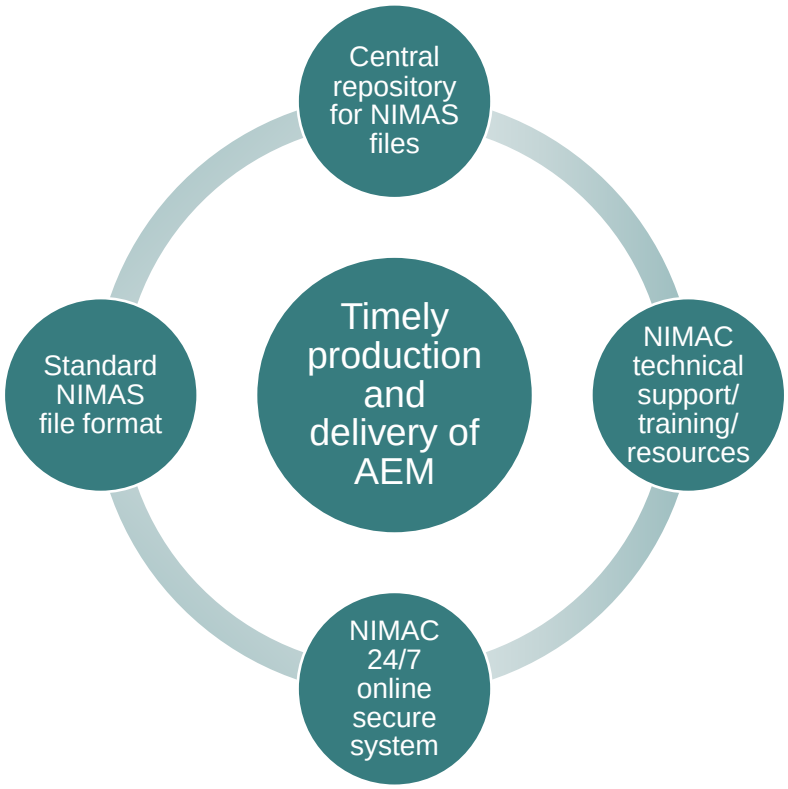
Data also suggest that the NIMAC/NIMAS increase the quantity and types of AEM titles available to students. Before the NIMAC/NIMAS, this same AMP recalled that her company could only transcribe four textbooks/year with 15-20 certified transcribers. Now, with the NIMAC/NIMAS and other facilitating factors like advances in technology and the braille prison programs, her team is able to transcribe several hundred each year.

As illustrated in the figure below, interview and survey data suggest that there are a number of ways that the NIMAC/NIMAS make accessible format production workflows more efficient which, in turn, facilitates the timely production and delivery of AEM. Having a central repository to which K-12 publishers submit NIMAS files provides a significant time savings over requesting files directly from publishers each time there is an identified need. When states have "all the source materials located in a single site" and have "real-time access to files," they can start production work sooner than before the NIMAC was operational. The standard NIMAS file format can also increase the speed with which states produce AEM. This format allows AMPs to bypass scanning, spend less time formatting, and produce AEM that is equivalent to the print book.

Data also suggest that the NIMAC's online system, website resources, and technical support facilitate the timely production and delivery of AEM. Users reported that the NIMAC's redesigned online system includes a number of features and functions that facilitate more efficient workflows. Users also indicated that the NIMAC's website resources support the efficient use of the NIMAC system. Lastly, users shared that the NIMAC's timely, clear, and useful technical support helps them resolve issues quickly. In combination, these time savings can be leveraged to produce AEM faster and deliver AEM to students in a timely manner.

Figure 15

The NIMAC/NIMAS Features that Can Contribute to the Timely Delivery of AEM



Collectively, this analysis of survey and interview data from NIMAC users and TVIs in Florida suggests that the NIMAC/NIMAS make it more likely now than it was before 2007 for students to receive high-quality accessible materials in a timely manner. This is significant because, as emphasized by parents and TVIs in Florida, when students receive AEM at the same time as their peers, they have equitable opportunities to learn and engage, grow and thrive, and develop the skills they need to be college and career-ready. Thus, although the NIMAC and NIMAS function at the earliest stages of a complex AEM production system, far removed from the actual classroom, NIMAC/NIMAS do support student learning. In the words of two NIMAC users, NIMAC/NIMAS enable students to have “access to the curriculum” at the same time as their peers and “empowers” districts to “meet AEM needs for all students.”

Appendix A: Data Collection Methods

Table A1

Survey Respondents and Response Rates

Group	Number of survey respondents	Response rate
Florida parents of braille-reading students*	69	38%
TVIs across Florida	63	28%
Accessible Media Producers (AMPs)	90	45%
Authorized Users (AUs)	82	71%
Publishers (Publishers) Vendors (Vendors)	98	41%
State Coordinators (SCs)	24	80%
Hybrid State Coordinators (Hybrid SCs)	18	82%
Total	**444**	

*This includes parents and other family members who may have attended the event with the student.

Table A2

Interviewees

Group	Number of interviews[2]
Parents of students who use braille	8
TVIs in Tampa, Florida	5
Publishers	4
Hybrid SCs	5
Vendors	3
AUs	2
National partners	2
AMPs	2
Transcribers	2
College student who is blind	1
Working professional who is blind	1
SCs	1
NIMAC staff	1
Total	**37**

[2] Includes both semi-structured and informational interviews.

Appendix B: Recommendations for Improving Braille

Table B1

Parent and TVI Suggestions for Improving Hard Copy Braille

AEM type	Production	Timeliness	Conditions
Hard Copy Braille Responses from 16 TVIs across Florida	• Include tactile graphics (8) • Include text (3) • More braille books with UEB (2) • Break volumes into logical groups, either chapters or units (1) • Reduce text per page by simplifying title (1) • Provide side bar, footnotes, and graphics in a consistent position (1) • Make with wider spiral on book borders for easier page turning (1) • Provide 2 copies of embossed textbook: one for home and one for school (1)	• "Faster delivery" (1) • Math titles available at same time as print textbook (1)	
Responses from 37 parents on the FRBC Parent survey	• Make charts easier to interpret (1) • Include text so parents can help with lessons (1) • Page number should match print textbook page numbers (1)	• Increase access/availability (12) • Receive materials at same time as sighted peers (2)	• More TVIs/TVI support (7) • More assistive technology (7) • Increase support from school/increase knowledge about braille among educators (3) • Increase knowledge about braille among peers (2) • Teach reading/typing at the same time (1)

AEM type	Production	Timeliness	Conditions
			• Pass laws that more effectively address student needs (1) • Provide instruction for parents on how child can continue work at home (1) • Provide early exposure to full code (1)
BRF files Responses from 9 TVIs	• Require less editing (3) • Include page numbers (2) • State the code being used (1)		• All state/county adopted textbooks should have BRF files. (1)

Parent Recommendations for Improving Braille

Parents who completed the FRBC Parent survey were asked to share the ways that braille in school could be improved to make it easier for their child to learn. A total of 37 shared 40 ways that braille in school can be improved to make it easier for their child to learn.

Parent quotes about the most common improvements listed above follow:

Increase access/availability (12)

- “Make materials more accessible. Not all lessons are done in braille.”
- “More materials so she can do more at home.”
- “Class notes for students should be prepared ahead of class time.”

More assistive technology (7)

- “Introduce the technology as early as possible.”
- “Find funds so the family can purchase the technology for the kids to have at home.”

More TVIs/TVI support (7)

- “The most important thing is for them to have a full-time teacher.”
- “More TVIs and braillists to help more children.”
- ‘Increase access to TVIs for homeschooled children.’

Increase knowledge about braille among peers (2)

- “Have the classmates learn some braille along with my child. Maybe a lesson or two.”

More support from school (2)

- “The school should get more involved with braille.”
- “Increase knowledge about braille among educators.”

TVI Recommendations for Improving Braille

Among the TVI survey sample, 71% (n = 45) reported that they currently use or have used braille with their students. These TVIs also shared, through open-ended responses to survey items, how hard copy braille can be improved to make these materials more useful and effective for student learning. The improvements noted by TVIs are organized under four overarching areas: tactile graphics, production, formatting and delivery. When more than one respondent listed a given improvement, the number of respondents who listed the improvement is indicated in parentheses. These TVI responses are verbatim.

Include tactile graphics (8):

- “Tactile graphics should be included in all texts that contain graphics. In a current reading textbook at the elementary level I have encountered the message ‘Chart,’ and then nothing there to depict the information in the chart.”
- “Our district personally needs a way to make tactile graphics; however, having school textbooks take 1 full school year to be brailled is an issue, especially if there is a schedule change.”
- “Include tactile graphics with color.”

Include text (3)

- **“**Including text where the classroom teacher can also help the student if the TVI is not there.”

More math books/More with UEB Math (3)

- “More titles being used in schools should be more readily available in braille for Math. For example, the Algebra Nation series, which is updated annually. Maybe this requires publishers to work more closely with braille producers to ensure that when print or digital books become available, hard copy braille is available at the same time.”
- “More braille books with UEB for Math”
- Another TVI explained, “Braillists don’t understand the purpose of what they’re teaching, and the braillists don’t do commas. If you’re giving them a textbook, more mistakes are happening, if you hire someone whose preparing basic material, it needs to be someone who is an expert in making that file ready. Just like all the others’ kids have editors for their book. They’re constantly short-changed.”

Changes to transcription (1)

- “Provide sidebar, footnotes, and graphics in a consistent position within the text (at beginning or end of all pages throughout the copy); This would also include district/state learning objectives with identifying codes (numbers, etc.) The learning objectives and codes often disrupt student reading especially for struggling readers. I realize it must be included but do so in a uniform manner to decrease interruptions. provide some navigation notes, if possible, to help readers navigate graphics. For example, a transcriber's note alerting the reader that there is a bar graph with the title at the bottom and the key at the top, etc. Include a separate table of contents, index and glossary volume and make it possible for the student to get two of these, to have one at home and one at school.”

BRF files

Should require less editing (3)

- "Braille files often require significant editing. For example, the current BRF files for middle school math have errors in spacing and the subtraction symbol is incorrect throughout each text."
- “Improve formatting.”

Include page numbers (2)

- "Can be improved by making sure the print page numbers are correct for ease of locating the print page in case the braille reader has a question about a word.”
- “Include correct page numbers to help with student navigation.”

State the code being used (1)

- "Clearly state the code being used at the beginning of the text and maybe at the beginning of-for example-each chapter. This is because when students search for words or titles, it would be helpful in guiding them as to how to enter their search protocol. Example: the word "probable". Provide guidance notes at the beginning stating, for example, page numbers are at the bottom/top of each page."

Appendix C: Recommendations for Improving Other Types of AEM

Table C1

Parent and TVI Suggestions for Improving Hard Copy Braille

AEM Type	Production	Usability	Availability
Digital text (with or without text-to-speech or voiceover) Examples: DAISY, EPUB. Responses from 14 TVIs	• Require publishers like i-Ready to make materials more accessible for students with multiple disabilities (1) • Include alt. text (2) • Tag headings (1) • Decrease translation errors (1) • Read all links (no skips) (1) • Ensure that files easily open on multiple devices (1)	• Make independent navigation easier for students (8)	• Decrease time it takes to get files when the files are not available (1)
Audio-only formats (e.g., MP3, human-narrated audio) Responses from 7 TVIs	• More human narration (3) • Ensure that speed is adjustable (2) • Require publishers like i-Ready to make materials more accessible for students with multiple disabilities (1) • Include voiced or audio symbols to denote headings, subheadings, etc. (1) • Include sidebar content at beginning or end of main page content and label as sidebar content (1) • Do not break up a sentence to provide page numbers (1)	• Make independent navigation easier for students (3)	
Large Print Responses from 11 TVIs	• Make physical book more manageable for students (4) • Ensure that font is large print (2) • In math textbooks, include only 1 graphic on page, no text (1) • Make margin larger (1)	• Provide 2 copies of textbook: one for home and one for school (1)	• "These formats could be accessible at a faster rate." (1)

AEM Type	Production	Usability	Availability
	• Include a separate table of contents, index and glossary volume (1) • Produce disposable workbooks for elementary students so students can write in workbook (1)		• Make more titles available (1)

Selected TVI quotations related to improving AEM follow.

Digital text:

Make independent navigation easier for students (8)

- “ensure independent navigation. Materials "born digital" need to be "born accessible."
- “Those, especially those with pictures often seem confusing to navigate.”
- Make searching easier
- Make downloading easier for students

Audio-only formats (e.g., MP3, human-narrated audio):

More human narration (3)

- “Human read books are more friendly for little kids, more pleasing to hear, adding sounds of passing pages helps them know they are moving along the pages of a book or the voice indicating changing page"

Make independent navigation easier for students (3)

- “Provide specific navigation directions for each individually produced item.”
- ‘Ensure that students can independently use tools to highlight, bookmark etc.’

Large print:

Tactile graphics in math (1)

- “math graphics with many elements could be left alone in a page to diminish visual clutter from surrounding text.”

Make physical book more manageable (4)

- “Make physical book more manageable for students: Fit lg print on smaller page (8.5 x 11), so they're more manageable and can fit in a student's backpack.
- “Books are very large and hard to carry.”
- Hard bound copies are more difficult to "handle" but comb-bound copies fall apart easily. If comb-binding, include fewer pages with larger comb diameter.

Ensure correct font (2)

- “The math large print (3rd grade is not 18pt font) it is just a bigger page and more room to write in."

Make margin larger (1)

- “The books enlarged where the pages are turned vertically need a larger margin where the binding is going to be. The books I have used this year lose at least 2 lines of text into the binding."

Increase ability of software to adjust print size (1)

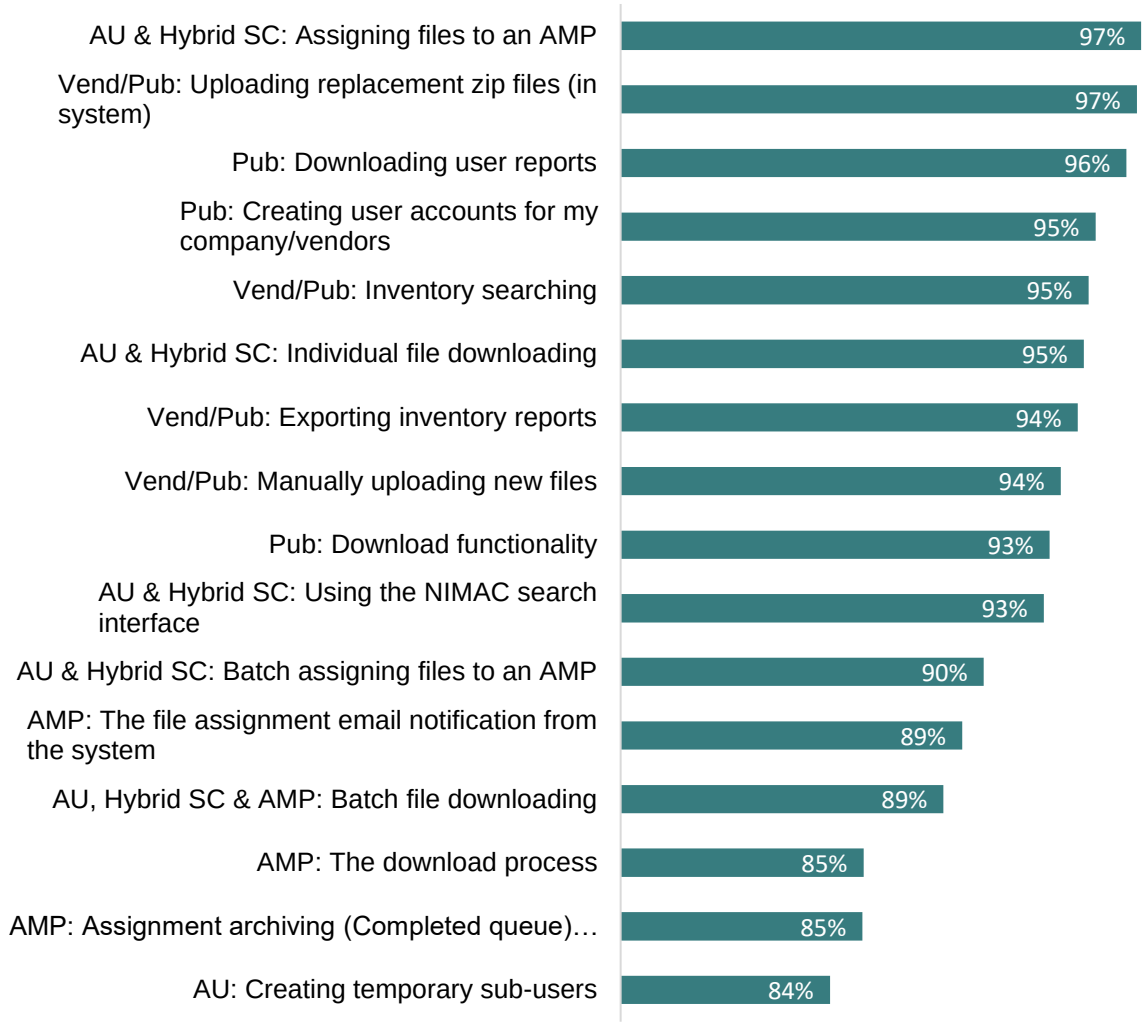
- “Digital resources could have more options for adjusting print sizes within the program.”
- [K3/AMP2] “If we didn’t have tactile graphics in textbooks, we wouldn’t have a good learning tool. Imagine doing a geometry problem without touching a shape, a world history book without using a map. Images are as important as braille.”

Appendix D: User-Rated System Functions

NIMAC users were asked to rate the functions below as fast, easy, or useful. The percentages in the bars below represent the percentage of responding users that agreed that a given function was fast, easy, OR useful. For example, if no users thought that a function was fast, easy, or useful, the percentage below would be 0%; if 100% of users thought a given function was fast, easy or useful, the percentage would be 100%.

Figure D1

Percent of NIMAC Users Reporting that a Function is Fast, Easy, or Useful



Appendix E: Bookshare Likes and Challenges

41 TVIs reported (during interviews or in the TVI survey) that they had used Bookshare to download books.

Table E1

Bookshare Likes and Challenges

What 31 TVIs like about Bookshare	What 20 TVIs Find Challenging about Bookshare
• Easy to use (11), easy to search (1), easy download (1) • Students can access books quickly (10) • Large selection (8) • Fast (4) Fast downloads (1) • Books are available in multiple formats (4) • "Accessible" (2) • Convenient (2) • Teacher can modify as needed (4) • Identifies student who will receive book (1) • Computerized voice that can be sped up (1) • Free (1)	• Book is not available (10) • Downloading (5) • Hard to navigate for some students (3) • Transferring files (3) • Challenges with technology limit student access (3) • Formatting (3) • Searching for the book is difficult (2) • Registration is difficult (2) • Computerized voice (5) • Signing in multiple students at once (1) • Customer service (delay in response) (1)

What TVIs Like about Bookshare

Easy to use (13)

- "It's simple to use. My students can use their iPhone to listen to textbooks via the app."
- "Bookshare is easy and it's fast. We download the DAISY file from Bookshare, it comes in a zip file, then we transfer it to a SD card, and put the SD card in the remote or into a refreshable braille machine. Kids can use DAISY for pleasure listening, chapter books and mystery books."

Students can access books quickly (7)

- "I like that students can receive their needed material immediately."
- "I could get any book my student needed QUICKLY and modify it as needed. Or my student could download a book with their individual account! No teacher needed."

Large selection (8)

- “This was my preferred method for obtaining digital books. There was a wide variety of books and most of the time I was able to get the book I needed.”

Fast (5)

- “If the books are available it is a quick process.”

Books are available in multiple formats (4)

- The books are available in multiple formats and can be used to make hard copy braille or put on a device.
- “I love the option of a MS Word file so that I can create what I need to for my users.”

What TVIs Find Challenging about Bookshare

Book is not available (10)

- “Getting enough textbooks converted to the DAISY format with images.”
- “I wish there were more academic subject-based titles and textbooks.”
- “Not all editions are on the website, can be tricky to select the correct book (pictures on website are often different from picture of book that I have physically).''
- “The time it takes to determine that book is not available takes longer than producing an accessible format (word/text file or hard copy braille).”

Downloading (5)

- “Multiple steps to download. Can't always find the student the book is for on the profiles.”
- “Having to download books for students”
- “Sometimes they get hung up and don't download.”
- “Time to download, steps to follow to assign and download a book. Steps not so friendly for someone with severe visual loss, even heard parents say it's confusing for them and not to voice pleasing the audio books.”

Hard to navigate for some students (3)

- “process is a bit cumbersome for some students with additional cognitive impairments”
- “Bookshare seems to be hard to navigate for a lot of my students, especially the younger ones.”

Transferring files (3)

- “Some of the books do not work with old Book Port”
- “Navigating between Bookshare and the app needed to display and read the book. Not all students did well with digital voices.”
- “I struggle with the digital formats and getting them to transfer from Bookshare to BrailleNote Touch.”

Challenges with technology limit student access (3)

- “technical difficulty with technology”
- “connectivity to device”

File format (3)

- “Lack of consistency in DAISY files with regard to images”
- “No page numbers in BRF files”
- One TVI shared that when she downloads the BRF (the embossable version of a Bookshare book) in Duxbury, she noted that the file requires “a lot of editing to get rid of so much stuff that we don’t need. I’ve never had a teacher that needed the sidebar. They just want the middle section.”