Abstract

A core component or modern education is the provision of online instruction. Across K-12, postsecondary, and ongoing professional learning, online instruction is growing in use and popularity. This increased utilization of online learning has also led to an increase in the research associated with online learning. However, even with the increased implementation and research of online learning, a lack of understanding for how to effectively address the needs of students with learning disabilities (LD) in these environments exists. Additionally, with recent widespread use of online learning in response to the COVID-19 pandemic, many are ready to abandon the use of online learning for students with disabilities. Given the negative impact a lack of experience in online learning environments can have on students with LD in their postschool lives, this manuscript aims to provide actionable guidance for planning, evaluating, and implementing effective asynchronous instruction.

Implementing Asynchronous Instructional Materials for Students with LD

Classrooms are reflections of the societies they inhabit. In a society where personal and mobile technology are ubiquitous aspects of modern work, leisure, and communication, it is no surprise that these tools are becoming essential components of contemporary education. In fact, the last decade has seen an increase in the offerings of online courses in both K-12 and postsecondary settings (NCES, 2020 a, b). Additionally, massive online open courses (MOOC) and online systems of learning are increasing in popularity for ongoing adult and professional learning (Reeves, et al., 2017). Considering these trends, it becomes evident that in order to meet the underlying goal of education in the United States; to prepare students to be college and career ready developing students’ ability to successfully engage in online learning environments is a core area to address prior to their entry into postsecondary education or the workforce.

However, information related to how students with disabilities access online learning environments has proven difficult to ascertain (Basham, et al., 2016). This has ultimately resulted in a less than full understanding of how to develop and implement online learning environments for students receiving special education services. In fact, the necessary transition to online learning during the COVID-19 pandemic made gaps in the research and practice in this area clear. Systemically, many educators reported feeling unprepared to deliver online instruction which understandably led to challenges by students and families who were also learning to navigate a new learning medium in difficult times (Williamson, et al., 2020). For special educators in particular, these challenges were amplified as they were required to navigate teaching in a new medium and the legal requirements outlined in the Individuals with Disabilities Education Improvement Act (IDEA, 2004). While these statements are in no way a disparagement of the effort of teachers in a time of crisis, they are meant to highlight the state of the field as it relates to online learning for students with disabilities. As access to online learning continues to grow in K-12 and postsecondary environments, access to online learning for students with disabilities is at a critical point. This is particularly true in the post-Endrew era where special educators must show progress towards appropriately ambitious goals for each student (Yell & Bateman, 2020). While extensive litigation is unfolding nationwide exploring the idea of whether or not online instruction is an appropriate for students with disabilities, it is important special educators do not abandon the medium. Failing to provide students with disabilities the opportunity to engage in online learning prior to their transition to postsecondary education or employment can create barriers in their postschool lives.

While the considerations for establishing and implementing online learning environments and materials for students with disabilities are numerous, there is no one size fits all solution. In both research and practice, there are endless permutations for investigating the factors that support students with specific disabilities realizing positive academic and social outcomes in specific online formats (e.g., synchronous, asynchronous, hybrid). However, given the rapidly evolving nature of research into the technology necessary for delivering online instruction, it is important that guidance be provided to practitioners for establishing and implementing effective online learning environments. This includes guidance that is tailored to the learning needs of specific student populations. To that end, this manuscript looks to offer focused action steps for establishing asynchronous environments that consider the needs of end users with learning disabilities (LD). While there are endless combinations for describing effective steps for developing a variety of online learning environments, the combination of designing asynchronous environments for students with LD is provided in order to address the needs of practitioners serving a large portion of the students receiving special education services.

**Supporting Students with Learning Disabilities in Asynchronous Environments**

         A persistent issue in the field of serving students with LD has been determining the best environment to provide instruction (Chamberlain, 2019). Applying this concept to serving students with LD online adds an interesting wrinkle to the issue as based on the design and affordances of tools available to teachers, online learning has the potential to be universally designed for a variety of student populations, though outcome research that supports this idea is limited (Edyburn, 2010). In place of existing research, however, is the reality that online learning is going to be utilized and available to students with LD and an opportunity for practice-based research to address this problem of practice. As described by Boscardin (2019), the most pressing problems of practice focus on timely topics, are actionable at the practitioner level, provide an opportunity for systems level improvement, and are high leverage in terms of their ability to impact student outcomes. For practitioners addressing this problem of practice, it is important to utilize practices shown to support students with LD while evidence in the area develops. While research may not necessarily fully guide practitioners, special educators can establish instructional cycles that proactively address student needs, support self-evaluation, and enable ongoing data based instructional decisions to be made to ensure that students are making adequate progress academically (Rowe, 2020).

Establishing this instructional model online requires teachers to make clear connections between their students needs, the goals of their curriculum (i.e., standards), the methods and materials they will use to provide instruction, and the assessments they will use to evaluate student mastery (Smith & Basham, 2014). In their planning, teachers are tasked with evaluating whether the tools available to them utilize effective pedagogy to deliver core content knowledge to students (Courduff, et al., 2016). For special educators, this is a dynamic process though, as a majority of instructional materials utilized in online learning are provided by outside vendors and may not necessarily meet the diverse needs of students with LD (Basham, et al., 2016; Greer, et al., 2014). While guidance is available to developers of comprehensive digital tools from the United States Department of Education (USDOE, 2015), the focus is mainly on adherence to accessibility guidelines (i.e., Section 504, Section 508) and not specific instructional practices that support diverse student populations, including students with LD.

Operating within the constraints of an asynchronous online learning environment, special educators must first take inventory of the tools they have available to them to instruct and assess students and then evaluate whether those materials meet the needs of their students and address the academic standards in their curriculum. In instances where available tools do not address these areas, teachers must then determine how to augment and supplement the existing materials, and ultimately evaluate whether the full package of available and supplemental materials led to mastery of academic standards. The purpose of this manuscript is to provide guidance for engaging in these phases of planning, implementing, and evaluating asynchronous online learning practices for students with LD.

**Planning and Evaluating Instruction**

As with any instructional endeavor, providing asynchronous instructional materials to students with LD should involve constant cycles of planning, evaluating, implementation, and reflection. A consistent theme in the literature that addresses online learning for students with disabilities emphasizes the use of the UDL Guidelines (CAST, 2018) to plan instruction and evaluate the tools available to implement that instruction (Greer, et al., 2014; Hashey & Stahl, 2014). While an important topic for teachers to consider, there is not necessarily direct guidance for how to utilize the UDL Guidelines (CAST, 2018) in a way that addresses the specific needs of specific student populations, including students with LD online (Rao, et al., 2014). However, the general emphasis of a UDL aligned curriculum is that through the proactive planning for diverse student needs, educators and the curriculum they implement can eliminate barriers faced by students and optimize student success (Rose & Meyer, 2002). Given that the majority of online instructional models, including asynchronous models, are driven by commercially available programs, special educators supporting students with LD need to be able to proactively evaluate available tools and determine where and how to augment or supplement these materials.

Fortunately, multiple tools (e.g., Boone & Higgins, 2012; Mize, et al., 2019; Schmidt, et al., 2017) have been developed for evaluating existing software, instructional technology, and educational applications in relation to the needs of students with LD. Across these tools is a focus on translating practices known to support the learning outcomes of students with LD against the instructional approaches of the materials being evaluated. When planning instruction and evaluating the materials available to them to instruct students, special educators employ a dual focus. First, teachers should ensure that tools address the academic standards and goals adopted by their local education agency (LEA). This requires educators to determine the knowledge and skills outlined in each standard and how to address them instructionally (Morgan, et al., 2014). This understanding allows teachers to shift their focus to the task of evaluating how the tools available to them apply to the standard and potentially create barriers to learning for students (Rao & Meo, 2017). To guide these processes, Figure 1 was developed to outline the planning process for teachers. In addition, Figure 2 is meant to synthesize relevant research and planning frameworks (i.e., UDL, TPACK) to provide practitioners an evaluation and planning tool for supporting students with LD in asynchronous learning environments. In combination, these resources are meant to map onto each other in order to support the implementation of asynchronous instructional materials. It is not our expectation that tools meet all elements of the developed checklist, but instead provide practitioners with the information necessary to make instructional decisions.

**Utilizing the Planning Tools**

To assist in the planning and evaluation process, Figure 1 provides a general overview for planning instruction and mapping standards to the asynchronous instructional material evaluation rubric (See Figure 2). These tools are meant to address the multiple realities special education teachers face when providing services to students with LD online. First, it is assumed that teachers main resource for providing instruction to students is going to be from a commercially available program. It is also assumed that teachers will be tasked with planning how to make specific elements of this program available to students in a way that addresses the standards of their LEA and the individual needs of their students. Additionally, it can also be assumed that any commercially available tool will not provide a one size fits all instructional solution. Given that instructional and planning time are finite, even with the affordances of most asynchronous environments, special educators are tasked with determining how to leverage the materials available to them and deciding when and how to supplement these materials.

In supporting students with LD in asynchronous environments, the process for evaluating, implementing, and supplementing asynchronous instructional materials should be systematic in nature. In the standards driven environments that special educators occupy, it is natural for the planning of any instructional endeavor to begin with the thoughtful consideration of the academic standards adopted by their LEA. Like many comprehensive curricula that are commercially available, digital instructional packages may provide resources that align the available learning resources with academic standards. While these materials provide a starting point for planning asynchronous lessons, it is recommended that planning go beyond aligning standards with instructional materials. As outlined in Figure 2, the next steps for special educators supporting students with LD in asynchronous environments is to critically analyze standards for their discrete knowledge and skills targets. Special educators should then determine where those targets are addressed within the tools they have at their disposal. With the structure of the standards widely adopted across the United States (i.e., the Common Core State Standards) advocating for broad and deep exploration of individual standards, it is expected that a standard will represent numerous subcomponent learning goals and that multiple goals representing varying levels of academic rigor will be addressed across multiple lessons (Morgan, et al., 2014). Ultimately it is practitioners, as experts of their students and their content area to determine when and how these identified learning objectives will be addressed. Making this a reality in an asynchronous environment requires teachers to have a familiarity with their available resources and facilitate students access to specific components of these tools that address specific curricular goals. Once the discrete learning targets have been established and the location of the associated instructional materials have been ascertained, teachers should then proceed to determine if the available materials align with the students with LD they serve.

Once materials have been located, special educators are tasked with ensuring that the materials meet the specific instructional needs of their students. The fourth step highlighted in Figure 2 outlines the core elements of instruction that asynchronous materials should provide to meet the needs of students with LD. As practitioners begin their evaluation, the evaluative criteria is meant to provide a tool for determining how available asynchronous instructional materials address discrete learning targets in a way that is also aligned to the needs of students with LD. In determining if instructional materials are indeed a fit for addressing the needs of students with LD, it begins by ensuring that an advanced organizer is provided for each activity. With student engagement being a key to student success, evaluators should be looking for an introduction to the lesson that helps students organize themselves for the tasks ahead, activates students background knowledge, makes the upcoming material relevant to students by orienting to previous and future learning, and establishes the goals and objectives for that session. Evaluators should then determine the extent to which the material systematically addresses the identified discrete learning targets. Specifically, evaluation for this should focus on determining if the material employs direct and explicit instructional procedures. These methods are exemplified in instruction that utilizes clear language, focuses students’ attention on key concepts without the inclusion of extraneous details, and thoughtfully employs multiple examples and practice opportunities that facilitate the systematic development of students’ acquisition and application of new knowledge and skills (Hughes, et al., 2017). Underlying these practices should be elements within each tool that support active student engagement during the modelling and practice phases of instruction. Here students should be provided frequent opportunities to respond, immediate feedback to their responses, and additional modelling as necessary. These practices help ensure that student engagement is maintained and that the instructional activities are resulting in the systematic acquisition of new skills and knowledge (Cook & Rao, 2018).

In conjunction with the modelling and practice of new material thoughtful considerations for the user experience (UX) of students with LD should be made. Evaluating the UX for specific users involves considering the factors that will create a smooth flow of use and accounting for any potential barriers users might experience in using developed tools (Krug, 2014). For students with LD, these considerations include: (a) how material is presented via the user interface, (b) how students navigate the tool (c) academic language supports, and (d) how the material is able to be customized in order to address any accommodations or modifications necessary for individual students. Significant evidence supports the notion that when information is presented clearly through the material presented to students with LD via digital interfaces, gains in new knowledge and skills can be made in a variety of academic areas (Hall, et al., 2014; Kennedy, et al., 2014; Liu, et al., 2019). When evaluating these aspects teachers should ensure that material is presented clearly and that any multimedia (i.e., text, visuals, audio) presented does not draw student attention away from the key information being presented (Mayer, 2020). Special educators should also preview the student facing materials to understand if any barriers may exist for students’ independent navigation of the tool. Additionally, while special educators should focus on how non-complex language is used to explain concepts, it is often unavoidable to include content specific academic language in lessons. Because students with LD can present with exceptional language needs in relation to academic language acquisition and use, it is important for instructional support in this area to be available to them (O’Connor, et al., 2019). These instructional supports should include definition information (i.e., what does the word mean), contextual information (i.e., how and where is the term used), relational information (i.e., where does this term fit into the overall context of the topics covered), and examples and non-examples of the term (Kuder, 2017). The final function special educators should look for are the customizable options and embedded assistive technologies (AT) enabled by the tool. This includes considerations for how the tool can be used to address students specific accommodations and modifications, as well as accessibility features. To ascertain if the tool addresses the instructional needs of students with LD, special educators should determine if the tool supports the varied presentation of materials in a way that allows educators to chunk information into relevant sections or provide students with a customized path for accessing instruction. Additionally, it should be determined if the tool supports students' access to embedded AT or is compatible with any AT devices the student currently uses.

Finally, special educators should ensure that adequate measures of student progress are available within the tools they are evaluating. This can include feedback or reports for how students respond to the practice opportunities embedded within the instructional materials but should also involve independent practice assignments and assessments for students to complete. Similar to the instructional materials, special educators should determine if the assessments provide a comprehensive and authentic representation of students’ mastery of the discrete learning targets addressed in each lesson, as well as the larger standard from which they are derived. Having multiple and robust sources of information related to students’ mastery of content supports educators making informed instructional decisions that also support the evaluation of any tools implemented.

**Procuring Supplemental Asynchronous Materials**

As is true with any instructional package, it is difficult to address the needs of all learners through a single approach or tool. While the platforms available to teachers may not check off all areas of the provided checklist, it should not dissuade practitioners from offering students with LD opportunities for engaging in online learning. Instead, a pragmatic approach to this issue would be to find ways to eliminate barriers that are present in commercially available tools and to find ways to provide alternative or supplemental tools where necessary. The evaluative criteria in Figure 2 are meant to support determining where and how commercially available programs address discrete learning targets aligned with larger academic standards in their (i) introduction of topics and lessons, (ii) utilization of direct and explicit instructional methods, (iii) provision of additional instruction and foundational skill supports, and (iv) use of assessments that provide an ongoing understanding for how students are progressing toward demonstrating mastery of each learning target and standard. Additionally, analysis for usability and accessibility are considered through the evaluation tool. It should be expected that any tool will have gaps in these areas across a comprehensive curriculum.

In addressing these circumstances, it is important that gaps in any of these areas be addressed sensibly. Knowing that time is an educator's most valuable resource, solutions must take into account the development and implementation timelines for developing or curating additional asynchronous learning materials. Both planning and instructional time are finite for practitioners, so employing supplemental strategies that have been shown to work for students with LD is pivotal in addressing gaps in available tools. Given the nature of the provided evaluation tool (See Figure 2) these solutions should also address specific components within the tool as well. In asynchronous environments where independent navigation of resources is key, it is important that any gaps in how students initiate and maintain engagement throughout the lesson be addressed.

Addressing any gaps begins with how students are introduced to the topics and navigation of each lesson in the advanced organizer. Here material should be made relevant to students with descriptions for when and how to access relevant instruction materials provided. If gaps exist within available tools here, practitioners can provide a few simple supplements. The first could be a graphic organizer that provides guidance through topics in the asynchronous environment and helps connect new topics to those previously covered. Graphic organizers have demonstrated multiple benefits for students with LD (Dexter & Hughes, 2011) and can be created with a word processor or templates can be found online. Additional, if further guidance or instruction is needed, teachers can create video models using screen capturing technology or web browser add-ons to record their own advanced organizer and include guidance for navigating specific learning materials. Similar to graphic organizers, the creation of video models is time efficient and can support student’s navigation of material via practitioners introducing topics and modelling the navigation of learning resources by recording their own computer screens. Additionally, if gaps are noticed in how instruction is delivered to students in practitioners’ available tools, video modelling can be used to deliver effective academic instruction to students with LD as well (Kellems & Edwards, 2016). Once it has been ensured that students will be provided an initial entry to engaging with the topics and instruction, it is important to ensure that their engagement is maintained across the lesson. This involves accounting for the practice opportunities, adaptability, and accessibility tools built into available tools. If gaps exist here, practitioners have a variety of options to pursue. For the practice opportunities, students should be provided frequent opportunities to respond and immediate feedback to their responses. If this does not exist, practitioners can explore online polling, quizzing, and survey tools that can be programmed to respond to specific responses and generate predetermined feedback. In relation to the adaptability and accessibility options, practitioners should ensure that all tools align with the components of a student’s IEP, as well as have the opportunity to be customized for student use. If accessibility tools are not built into available tools, practitioners will have to support students in utilizing external tools (e.g., screen readers, alternative text) to access materials. As is the case with their available resources, teachers should apply the same critical lens (See Figure 2) either proactively to materials they develop or in an evaluation of any materials they curate to address their learning objectives and student needs. Additionally, when and where available, practitioners are highly encouraged to reach out to other teachers, related service providers, instructional or technology coaches, and administrators in their school, district, and professional learning communities to seek out additional guidance on tools that can support students with LD.

Implementing and Evaluating Asynchronous Instruction

Once teachers have identified the resources that address specific learning targets and the location of those resources, it is time to map those items onto lesson plans and implement them with students. Though the Asynchronous Instructional Material Evaluation Tool (See Figure 2) special educators should have determined the discrete learning targets aligned to the standards they are addressing. This includes the determination of whether or not the tools fully address the learning objective and the identification and implementation of supplemental materials. With all of the resources in place, teachers should then decide how to systematically make these materials available to students in a way that facilitates access to materials that systematically introduce foundational topics before covering more complex knowledge and skills. These learning targets should then be mapped into specific lesson plans, with instruction being delivered through the identified tools. Given that specific elements the utilized tools are aligned to specific discrete learning objectives, making determinations as to what materials, either available in teachers comprehensive digital curriculum or the supplemental materials procured, were effective at addressing the discrete learning objectives and student needs is built into the systematic nature of evaluating and implementing asynchronous instructional materials. It is this process that supports local data collection and decision making that supports teachers in addressing any learning objectives that were not mastered by students and engaging in continuous cycles of improvement.

**Discussion**

With online learning playing such a prevalent role in K-12, postsecondary, and ongoing professional learning, it is important that students with LD be included in learning online. While the mass adoption of online learning that occurred in response to COVID-19 highlighted the challenges associated with providing education to students with LD online, the medium should not be abandoned. It is recommended that implementation of any online learning model proactively consider student needs. This manuscript has looked to provide guidance for ensuring the instructional components of asynchronous learning materials are aligned to quality instructional components, though other considerations for supporting students with LD need to be addressed by practitioners. While research in this area will become available and undoubtedly further our understanding of what embodies effective online education for students with LD, current practitioners should embed practices currently shown to support students with LD when supporting them online. This manuscript is developed to address one aspect of this issue, effective and systematic asynchronous instruction.

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**Planning Asynchronous Instruction for Students with Learning Disabilities**

Name: Dates:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Standard(s)/IEP Goal(s) |  | | |  | | |  | | |
| Discrete Learning Targets:  **j**  **k** | A: | | | B: | | | C: | | |
| Location of content in commercial program:  **l** |  | | |  | | |  | | |
| Lesson checkpoints | **Y** | **N** | **S** | **Y** | **N** | **S** | **Y** | **N** | **S** |
| Uses advanced / graphic organizers |  |  |  |  |  |  |  |  |  |
| Explicit Instruction |  |  |  |  | **m** |  |  |  |  |
| New material able to be chunked |  |  |  |  |  |  |  |  |  |
| Draws attention to key concepts |  |  |  |  |  |  |  |  |  |
| Provides multiple models & examples |  |  |  |  |  |  |  |  |  |
| Multiple practice opportunities |  |  |  |  |  |  |  |  |  |
| Immediate corrective feedback |  |  |  |  |  |  |  |  |  |
| Supports generalization by practicing related skills |  |  |  |  |  |  |  |  |  |
| Customizable to student accommodations |  |  |  |  |  |  |  |  |  |
| Able to be modified |  |  |  |  |  |  |  |  |  |
| Assessment aligns to standards |  |  |  |  |  |  |  |  |  |

Figure 1. Asynchronous planning checklist