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Accessibility in Questionnaire Research: Integrating Universal Design to Increase the Participation of Individuals With Learning Disabilities

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This paper explores how to apply the principles of accommodations and universal design (UD) in research methods involved in quantitative research (e.g. questionnaires). In particular, we focus on how to make research more accessible for individuals with Learning Disabilities (LD), while also providing suggestions for potential participants of research more generally. This paper first reviews accommodations provided to students within an educational setting, focusing on the components of setting, timing, presentation and response format. Following this discussion, we discuss UD and how it can be adapted to the research process (e.g. the creation of surveys, and data collection). Next, we draw on components of accommodations and universal design to offer suggestions for those conducting research with individuals with LD. In closing, we provide a table with key UD and accommodation questions that researchers can use to guide questionnaire design thereby advancing the field when it comes to accessible research design.

Keywords: **Disabilities; Learning Disabilities, Universal Design, Accommodations, Research Methods, Questionnaires**

Introduction

Research explores a multitude of topics, across a variety of disciplines. To help researchers understand these topics, a representative sample of individuals from the population must be able to participate (Creswell, 2014; Mertens & McLaughlin, 2004). However, participation in research can be challenging for those with special needs (e.g. students with learning disabilities) who might need accommodations to be involved. While accommodations are common in schools for assignments and testing situations, the use of accommodations in research has received much less attention. On occasions when accommodations have been made in research designs, the process generates a number of questions surrounding the reliability and validity of results (Lovett & Lewandowski, 2015; Phillips, 1994). Universal design (UD) also supports individuals who might need accommodations, by making environments or products more accessible from the beginning (Lovett & Lewandowski, 2015). While UD has become an accepted practice in education in recent years, demonstrated in the development of a specific universal design for learning (UDL) framework, applying the principles to educational research designs has not been explicitly addressed.

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The aim of this paper is to examine accommodations and UD and consider how to integrate these principles into questionnaire research methods to make them more accessible to participants who have learning disabilities (LD). We focus on increasing participation opportunities for students with LD within the post-secondary setting because this population is often utilized in research. We begin by outlining the definition of LD, highlighting challenges in areas related to reading and writing – two skills often necessary to participate in questionnaire research. Next, we review accommodations provided to students with LD in educational settings. We then consider how accommodations and UD can be translated into the realm of questionnaire research. We conclude by making recommendations for how researchers can adapt questionnaires to increase accessibility for participants.

Learning Disabilities

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, 2013), a specific learning disorder (SLD) involves difficulties learning and using academic skills such as: (a) inaccurate or slow and effortful word reading, (b) reading comprehension, (c) difficulties with spelling, (d) difficulties with written expression, (e) difficulties with mathematics such as number sense, number facts, calculations or mathematical reasoning (p. 66). Symptoms must be present for at least 6 months (despite intervention efforts), and impact one's academic performance substantially when compared to chronologically age matched peers. SLDs can vary in severity and are often referred to based on the specific domain area (e.g. reading, written expression or mathematics; DSM-5, 2013). For example, a student with a SLD in reading could have difficulty with phonological awareness and processing, word decoding, fluency in reading, the rate at which they read, and reading comprehension (Gregg et al., 2008; Kemp, Parrila & Kirby, 2008; Lindstrom, 2007; Trainin & Swanson, 2005). In contrast, an individual with SLD in writing could have difficulty with the process of writing (e.g. spelling, grammar), or the quality of their written expression (e.g., clarity and organization; Cortiella & Horowitz, 2014; DSM-5, 2013). Among the adult population of individuals with LD, reading and written expression disorders are the largest subgroups (Lindstrom, 2007).

It should be noted that at times, SLD are referred to as learning disabilities (LD). According to the National Centre for Learning Disabilities (NCLD; Kasten, n.d.), the word disorder is a medical term, and as such is used in the DSM-5, whereas the term learning disability is a legal term, and utilized within legal documents such as the Individuals With Disabilities Education Act (IDEA). For the purposes of this paper, we will be using the term Learning Disability (LD).

In terms of origin and diagnosis, LDs are suggested to result from neurological components relating to brain structure and function (DSM-5, 2013; Plomin, & Kovas, 2005). Additionally, some research suggests a genetic component (Cortiella, & Horowitz, 2014; DSM-5, 2013; Plomin, & Kovas, 2005). For example, the DSM-5 (2013) reports that if an individual has a first-degree relative with a LD in reading, he/she is 4 to 8 times more likely to have a SLD than an individual who does not have a first-degree relative with a SLD. The DSM-5 (2013), suggests the prevalence rate of SLD is between 5% to 15% of school age children, while the prevalence of SLD in adults is unknown but is estimated at 4%. According to the Learning Disabilities

Association of Canada (LDAC, 2015), they estimate that one in ten Canadians have a LD, with the prevalence rate varying depending on the specific LD. For example, SLD in reading is suggested to be more prevalent than those related to mathematics and writing (Cortiella, & Horowitz, 2014; Hatcher et al., 2002; Mash & Wolfe, 2010). Students with an LD related to reading have difficulties processing language, primarily the phonological aspects of language that require the ability to analyze, produce and manipulate speech sounds of spoken words (Hatcher et al., 2002) which can impact word reading, reading fluency and spelling (Gregg et al., 2008; Kemp, Parrila & Kirby, 2008; Lindstrom, 2007; Trainin & Swanson, 2005). Given the nature of quantitative research methods (e.g. questionnaires), which predominantly involve reading and writing components, and the higher prevalence of LDs related to reading, we will focus the remainder on this paper on those challenges.

As a result of the challenges experienced by students with LDs, classroom assessment practices at the post-secondary level (e.g., examinations) may not adequately reflect students' acquired knowledge and may instead assess construct-irrelevant variance, defined as barriers to performance that are created by the disability and not the construct of interest (Cahalan-Laitusis, 2004; Fuchs & Fuchs, 2001; Lovett, 2010). For example, if a student is completing a reading comprehension task, reading speed may prevent them from completing the task within the standard time provided. Therefore, to eliminate variance in performance that is not related to the construct of interest, accommodations are frequently implemented. For the purposes of this paper, accommodations are defined as "intentional change[s] to the testing process designed to make the test more accessible to students with disabilities" (Sireci, Scarpati & Li, 2005, p. 460). In the example above, extended time could be provided to the student so that a slow reading speed would not impact the student's ability to complete the task. Accommodations are designed to aid in the measurement of a construct (Bolt & Thurlow, 2004; Cahalan-Laitusis, 2004). As such, accommodations are often referred to as "leveling the playing field" (Bolt & Thurlow, 2004; Fuchs & Fuchs, 2001; Lovett, 2010). With accommodations, the performance outcomes obtained by students with disabilities are said to be representative of the same attributes, abilities and knowledge of their peers (Gregg & Nelson, 2012; Lovett, 2010).

Accommodations for Students with LDs

Although students with LDs receive many accommodations within the classroom, we focus our discussion around accommodations during testing because we believe they are most similar to the type of accommodations that would be necessary in questionnaire research. There are a number of testing accommodations that students with a diagnosed LD can access including: additional time, use of technology (e.g., computers or speech-to-text software), having a separate room for testing, use of a dictionary (or spell-check) or thesaurus, and breaks during testing (Harrison et al., 2008; Weis, Dean & Osborne, 2014). Although these accommodations are common, there are many questions that arise when evaluating whether the implementation of accommodations is appropriate (Lovett & Lewandowski, 2015; Phillips, 1994). Indeed, Phillips asked five important questions over two decades

ago that still influence considerations as to when (and which) accommodations are appropriate. These questions are (p. 104):

1. Will format changes or alterations in testing conditions change the skill being measured?
2. Will the scores of examinees tested under standard conditions have a different meaning than scores for examinees tested with the requested accommodation?
3. Would nondisabled examinees benefit if allowed the same accommodation?
4. Does the disabled examinee have any capability for adapting to standard test administration conditions?
5. Is the disability evidence or testing accommodations policy based on procedures with doubtful validity and reliability?

Phillips suggests that if any of the questions above produce a *yes* response, then the accommodation is not appropriate.

With these criteria in mind, testing accommodations can be grouped into four categories: (a) setting, (b) timing (c) presentation, and (d) response. A setting accommodation can include a private room, screens or apparatuses to block distractions, and other changes made to the test-taker's surroundings (Cahalan-Laitusis, 2004). The second type of accommodation is timing, which can include allowing for breaks during testing, multiple-testing sessions, additional time and flexibility around scheduling exams (e.g., which day, and what time of the day; Bolt, Decker, Lloyd & Morlock, 2011; Cahalan-Laitusis, 2004; Lovett & Lewandowski, 2015). Providing students with extended time is the most common accommodation provided for students with LD (Bolt & Thurlow, 2004; Fuchs & Fuchs, 2001; Lindstrom, 2007). The third type is presentation, include making alterations to how the testing material is presented, for example, having an audio presentation of the content instead of, or in addition to, the written component (Cahalan-Laitusis, 2004). The fourth type of is response format, which generally consists of providing alternative options for responding to the assessment (e.g. computer, or scribe; Cahalan-Laitusis, 2004).

The intention behind accommodations is to provide students with equal access by removing unnecessary challenges or barriers that create construct-irrelevant variance (Cahalan-Laitusis, 2004; Fuchs & Fuchs, 2001; Lovett, 2010). However, there are many challenges when it comes to insuring proper accommodations are in place. For example, the heterogeneity of LD makes it difficult to determine which accommodations will be most appropriate for each student (Fuchs & Fuchs, 2001). Indeed, accommodations must be selected based on individual student needs and there is no "one size fits all" solution (Weis, et al., 2014). Therefore, examining accommodation efficacy can be complicated endeavor and as such is beyond the scope of this paper. For example, Gregg and Nelson (2012) conducted a meta-analysis examining the effectiveness of extended time as an exam accommodation for students with LD and determined there were "more questions than answers" (p. 128). They suggest that there is a shortage of empirically based studies that have been conducted to provide evidence as the effect of extended time on performance (Gregg & Nelson, 2012). Furthermore, there is a body of research that examines the disconnection between accommodations provided and objective support for their implementation

(e.g., Harrison, Nichols & Larochette, 2008; Weis et al., 2014). While this literature is also outside the scope of this paper, it does speak to the complexity of providing accommodations for various students with disabilities, whom have different levels of needs, and therefore, require various supports to complete exams.

Universal Design

As an alternative to providing students individual accommodations, Universal Design (UD) involves designing environments or tasks to allow for greater accessibility for all people. UD began in the field of architecture, wherein the goal was to make buildings and products more accessible to everyone (National Disability Authority, 2012). UD is regularly defined based on the definition outlined by the Center for Universal Design (1997): "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design." Since its inception, the principles of UD have been adopted by other fields as well, including education, where the shift to areas of learning, instruction and more recently assessment is evident (Lovett, Lewandowski, 2015; Thompson, Johnstone & Thurlow, 2002). UD principles can be implemented in multiple ways within education; for example, in how learning opportunities for students are planned, how teachers design their instruction, and how teachers assess the learning of their students. In particular for this paper, we draw on the area of universal design for assessment (UDA), as it provides the closest match to the development of questionnaire research. The design of a questionnaire could be conceptualized as similar to the design of an assignment or exam.

UDA is defined as "a process for ensuring that tests are developed and administered to provide the widest range of students with the opportunity to demonstrate their construct-relevant skills, knowledge and abilities, without compromising the validity of inference drawn from the test results" (Ketterlin-Geller & Johnstone, 2006; p. 167). As such, UDA intends to capture the skills, knowledge and abilities of students, thereby reducing the need for additional accommodations (Ketterlin-Geller, 2005). Researchers have examined UDA in multiple ways, such as test item creation on statewide assessments (Johnstone, Thompson, Bottsford-Miller, & Thurlow, 2008), as well as classroom tests and exams for elementary (Ketterlin-Geller, 2005) and high school students (Kettler et al. 2012).

Proposed Theoretical Framework: Universal Design for Research

An emerging area of consideration for UD is research. Indeed, many people have commented on the need for alterations in research practices to accommodate individuals with disabilities (e.g., Meyers & Andresen, 2000; Crook et al., 2015). For example, if an individual with a LD is unable to access the content within a questionnaire, it can make it difficult for the individual to fully participate and introduce a variety of challenges when interpreting their responses. Even worse, the individual may simply choose not to participate at all. To make research participation more accessible for individuals with LD, a combination of accommodations and UD for research (UDR) should be implemented where appropriate (Crook et al., 2015).

The remainder of this paper will extend the discussion of accommodations and UD to the area of research methods. We focus on UD first because it sets a

stage to increase accessibility for all participants. However, we acknowledge that UD will never entirely remove the need for accommodations, and therefore, we discuss accommodations as well (Ketterlin-Geller & Johnstone, 2006). The overlap between individual accommodations and UD are summarized visually in Table 1. Specifically, we consider the setting, timing, presentation and response components of questionnaires, and provide suggestions for designing questionnaires to maximize participation as well as additional accommodations that may still be required.

Table 1. ***Example Comparisons between Accommodations and Universal Design***

Category	Accommodation Example	UD Example
Presentation	Have a facilitator read test material to students with LD.	Design testing materials at a reading level accessible to all students.
Setting	Private room for students who are easily distracted.	Provide students with choices as to when and where tests are completed.
Timing	Give students with LD extended time for tests.	Design tests to be free of time pressure for all students.
Response	Provide use of a scribe for students with LD.	Provide students with assistive technology options for responses.

Standard Questionnaire Designs

Questionnaires are a popular choice for obtaining information in the social sciences (Goddard & Villanova, 2006; Rumrill et al., 2011). Researchers can administer questionnaires in a variety of settings including in-person, over the phone, or online (Goddard & Villanova, 2006). In terms of timing, questionnaires should be relatively short to prevent fatigue, however, the definition of short is difficult to ascertain. Although a blog post on the Surveymonkey© website suggests that participants do not want to take a questionnaire that is longer than 10 minutes (Van Susteren, 2017) in reality questionnaires can take from a few minutes to an hour depending on their purpose and the audience. In terms of presentation and response options, questionnaires can include many different types of questions including: multiple choice, true/false, rating scales, checklists, or open-ended responses (Mertens, 2015). Furthermore, they are designed to allow individuals to self-report their feelings, beliefs or attitudes on a variety of topics (Goddard & Villanova, 2006).

A Universal Design and Accommodation Approach to Questionnaires

The components of setting, timing, presentation and response are often targeted by accommodations and UD and are clearly present in the design and delivery of research questionnaires. Therefore, research questionnaires should be able to be modified in terms of these four components as has been done in educational settings. Next, we review how typical setting, timing, presentation, and response formats may pose challenges in general for questionnaire design and more specifically, for participants with LD, making recommendations for adjustments based on the principles of UD.

Questionnaire Setting. Questionnaires can be completed in a variety of settings, both in-person, and online (Goddard & Villanova, 2006). When conducted in-person, researchers need to ensure that all participants understand the directions to reach the data collection location (e.g., how to drive, where to park, what building, etc.). One area that is gaining popularity is web-based surveying. This can be seen with the creation of multiple online platforms (e.g. SurveyMonkey, Google Forms, REDCap, etc.). One advantage of online questionnaires is that it may increase self-disclosure because any given participant may feel more comfortable completing questionnaires designed to be conducted anonymously online, which could facilitate sharing their experiences and opinions more openly (Selm & Jankowski, 2006). However, one disadvantage of online delivery is that it reduces the certainty that participants meet the participation criteria. For example, a study may be intended for men but completed by women. Another challenge with online questionnaires is that there is no way for the researchers to clarify questions that arise when the individual is completing the questions. To reduce this concern, researchers can design questions that are clear and concise (discussed further in the presentation section). Researchers must weigh the pros and cons before determining which setting is best to deliver their questionnaire.

For students with LDs in particular, the setting for where to complete the questionnaire might pose some additional challenges. For instance, Crook and colleagues (2015) highlight a number of barriers that individuals with LD identified for participating in research. In particular, the individuals involved in their focus group discussed challenges with directions and accessibility of buildings. Therefore, when inviting individuals to participant in research, researchers must be cognizant of how participants with LDs may need additional clarification on how to get to the destination. A UD approach would be to provide all participants with both written directions and a map. Another consideration for participants with LD is self-disclosure. Individuals with LDs often do not want to share information about themselves, particularly related to their LD, due to the potential stigma others might hold about having a LD (Denhart, 2008; May & Stone, 2010). Therefore, if researchers want to study LD itself, recruitment can be particularly challenging, and an online questionnaire might be seen as more advantageous. Researchers need to consider which setting will be most advantageous for students with LDs.

Timing (length) of Questionnaire. Best practices for general questionnaire design suggest that, overall, the questionnaire should be as concise as possible (Rea, & Parker, 2014). However, there is no set rule for how long questionnaires should be, and length tends to depend on the specifics of the questionnaire being conducted (Goddard & Villanova, 2006). Researchers must find a balance between the effort and time required to determine how many questions are appropriate (Rea, & Parker, 2014). However, it has been suggested that questionnaires take participants no longer than 10 minutes to complete (Van Susteren, 2017). If we consider the standard amount of time that students with LDs are provided for tests in school is time and a half or double time, a questionnaire may need to be significantly reduced so that those with LDs are also able to finish within 10 minutes. If too long, those with LD might exit the questionnaire before they have completed all of the questions. Therefore, questionnaire developers need to be conscious of the time requirements that individuals with LDs

might need. A UD approach might be to ensure that all students are able to complete the questionnaire items within reasonable amount of time (depending on the specific questionnaire). This could be accomplished through pilot testing questionnaires with individuals who identify as having LDs or have other challenges that might impact the time required to complete the questionnaire. However, if the questionnaire cannot be appropriately reduced in length, it might be necessary to accommodate individuals by allowing them to complete the questionnaire over multiple sessions (Mertens, 2015) to reduce the amount of time required within one sitting.

Presentation of questions in questionnaires. Mertens (2015) makes a number of general recommendations when it comes to designing research questions for clarity including: providing definitions of key terms, avoiding negatively worded items, avoiding jargon by having short items, and limiting each question to one idea. If participants cannot understand the questions, they can quickly feel alienated from the process and either make little effort going forward or terminate completion of the questionnaire (Brace, 2013). Another consideration is the ordering of the items. Researchers note a number of common practices when it comes to the design of questionnaires, including beginning with introductory questions that are related to the construct of interest, but easy to answer, while leaving more sensitive questions to near the middle or end (Fowler, 2013; Rea, & Parker, 2014). Brace (2013) suggests using a funneling approach for questionnaires, wherein general questions on a topic are presented first, and the more specific questions later in the questionnaire. The physical presentation of the questions is also very important. If the size of the font is too small, it can cause a crowded presentation of items, which can lead to error (Brace, 2013). Leaving space between questions can also aid in the completion of the questionnaire, while also appearing clear and uncluttered to respondents (Fowler, 2013). Another important consideration is the font utilized (Rello & Baeza-Yates, 2013), to ensure that the items are easy for the participants to read.

With those considerations in mind, it is important to reflect on their importance when conducting research with individuals who have LDs specifically. For example, ensuring that questions are clear and concise is particularly important for those with LDs who have challenges when it comes to reading comprehension (Gersten, Fuchs, Williams, & Baker, 2001). This could be accomplished in-person by having a research assistant available to read questions to a participant having difficult with a question, or online by provided a button beside each question that would read the question aloud to the individual. This would provide a UD approach as everyone would be able to see the button, and therefore, anyone would be able to access the audio in addition to the print materials. If these two options are not available to researchers, accommodations may be needed to assist these individuals with the reading required by the questionnaires. A common option in classes at post-secondary (Abreu-Ellis & Ellis, 2006; Sharpe et al., 2005) is to provide an assistive technology that involves text-to-speech options (Lang et al., 2014; Sharpe et al., 2005). Individuals can differ in how they perceive and comprehend information (Mertens, 2015), therefore, combining the auditory and print formats can create a more universal design for research that is more accessible to all participants.

The ordering of the questions presented can be particularly important for participants with LD. This is because one of the components for a diagnosis of an LD is

difficulty with executive functioning, including task switching (Ministry of Education, Province of British Columbia, 2011). Therefore, ensuring that related questions are placed together is important to ensure that students are able to follow the sequences of the questions being asked (Rea & Parker, 2014). Furthermore, placing questions of a sensitive nature towards the end can be important for individuals with LD. These individuals often have low rates of self-identification of LDs, often resulting from fears of prejudicial reactions around self-disclosure (Denhart, 2008; May & Stone, 2010). A UD approach for all participants might be to have individuals progress through questionnaires to some degree, before asking more sensitive questions to ensure that participants are comfortable completing those questions (Rea & Parker, 2014).

Another important consideration is the type of font when it comes to questionnaires designed for students with LDs. Research by Rello and Baeza-Yates (2013), determined that the type of font can have a significant impact on how easy the text is for people with dyslexia to read. They determined that good fonts are Helvetica, Courier, Arial, Verdana and Computer Modern Unicode. Recently, an OpenDyslexic font has been created specifically to aid those with dyslexia in reading. However, Wery and Diliberto (2016) found no improvement in reading rate or accuracy for students with dyslexia when reading the OpenDyslexic font compared to Arial and Times New Roman. Nevertheless, it is important to note that simple text can be easier for these individuals specifically and would also be easier for all participants more generally. Font choice should be taken into consideration when making questionnaires with UD in mind.

Response format of questionnaire. Questionnaires tend to include closed- or open-ended questions. Closed questions can include a variety of formats including forced-choice (e.g., yes or no) or selected responses (e.g., Likert-type scales; Rea & Parker, 2014). If closed-ended questions are selected, then details about what sort of options, how many, and the presentation format become important to consider, including the number of possibilities multiple-choice questions contain (see Rodriguez, 2005; Vyas & Supe, 2008 for a review). Often individuals are provided with four or five options on these types of questions, while researchers advocate for the use of three options as ideal (Sidick et al., 1994; Rodriguez, 2005). Utilizing three items has been found to reduce the time involved in designing multiple-choice items and potential errors in the writing of questions, (Vyas & Supe, 2008).

The number of options for Likert-scale questions is also important to consider. Likert-scales differ from multiple-choice items, as Likert-scale asks individual to place their beliefs or behaviours on scale, usually from agree to disagree or always to never, while multiple-choice items ask participants to select from a group of independent options. For Likert type scales, it has been suggested that a 7-point scale, may be more advantageous than a 5-point scale, as it provides more options to properly reflect the opinions or beliefs of the individuals responding (Joshi et al., 2015). Therefore, the type of question will be important for determining the optimal number of items.

The main limitation of closed-ended questions is that they limit participants' ability to express their true opinions or feelings (Goddard & Villanova, 2006). To remedy this, questionnaires can also consist of open-ended responses, wherein the

individual is able to communicate through their own words on the page rather than selecting an option from a list provided (Brace, 2013; Rea, & Parker, 2014). However, there are challenges with open-ended questions. For example, Fowler (2013) notes that when individuals in general are asked to write their responses, the answers are typically incomplete, vague or difficult to code and evaluate in later analyses.

When it comes to students with LD, close-ended responses have a number of advantages. For example, closed-ended responses provide contextual clues that could help these students decode the meaning of the question. Furthermore, closed-ended questions are less onerous to the individuals (Rea, & Parker, 2014), as it is easier to select a response than to come up with one. For those with working memory challenges, such as individuals with LDs, this can be very advantageous (Swanson, 1994; Swanson & Siegel, 2001). Furthermore, having 3 item multiple-choice questions can assist students with LDs who have difficulty with reading, as the length of each question would be reduced, decreasing the amount of text to read and by extension, time required to complete the questionnaire. Indeed, when designing a questionnaire with the principles of UD in mind, reducing the amount of text for each question might be beneficial to all participants.

Open-ended responses also have their advantages and disadvantages for individuals with LDs who continue to have difficulties with writing (Harrison, 2009; Li & Hamel, 2003). In a synthesis of the literature on the characteristics and most common errors in the writing of students in higher education with LD, Li and Hamel (2003) found that challenges in writing occurred across two categories (a) mechanical (e.g. spelling), and (b) content (e.g. organization). Therefore, open-ended responses might not provide researchers with the desired results when utilized with this population. One avenue for assisting individuals with LDs completing the open-ended responses on questionnaires might be to provide them with speech-to-text software. Indeed, a UD approach might be to provide all individuals with the option of typing their answers, or audio recording their responses, which can then be transcribed for analysis.

Conclusion

In conclusion, this paper has examined questionnaire design and implementation to be more accessible for students with LDs specifically, and all students more generally, building from accommodation and UD principles. We propose a list of key questions researchers should address when developing research that is more accessible to potential participants (Table 2) based on the areas of setting, timing, presentation and response. These questions are specific to the research highlighted in this paper and provide a guide for individuals working with diverse populations moving forward. Furthermore, Figure 1 provides examples for developing a questionnaire with universal design and accommodations in mind. The information presented in this paper can assist researchers in developing questionnaire-based research projects that stand to increase the accessibility for all participants and especially participants with LDs.

Table 2. ***Key Questions for Developing Accessible Research***

Setting	Is in-person or online a better setting for participants? Is there someone available to answer questions that might arise? Where is the best place for individuals to participate? Are locations for the study easily accessible to all participants?
Timing	Can the questionnaire be completed over multiple settings if needed? Is the time needed to participate reasonable based on characteristics of the individuals needed for the study?
Presentation	Is the wording of questions at an appropriate level for all participants? Are the questions straightforward (i.e., clear and concise?) Have key words or terminology been defined? Does the order of questions follow a logical order? Is the physical presentation of questions clear (i.e., font, size, color)?
Response	Has the response format (i.e. open or closed ended) taken into account participant characteristics? Is the number of options for multiple-choice questions appropriate? Does the likert scale have a suitable amount of points? Has directionality (i.e. agree to disagree vs. disagree to agree) and orientation (i.e. horizontal vs. vertical) been contemplated? Should assistive technology options be available?

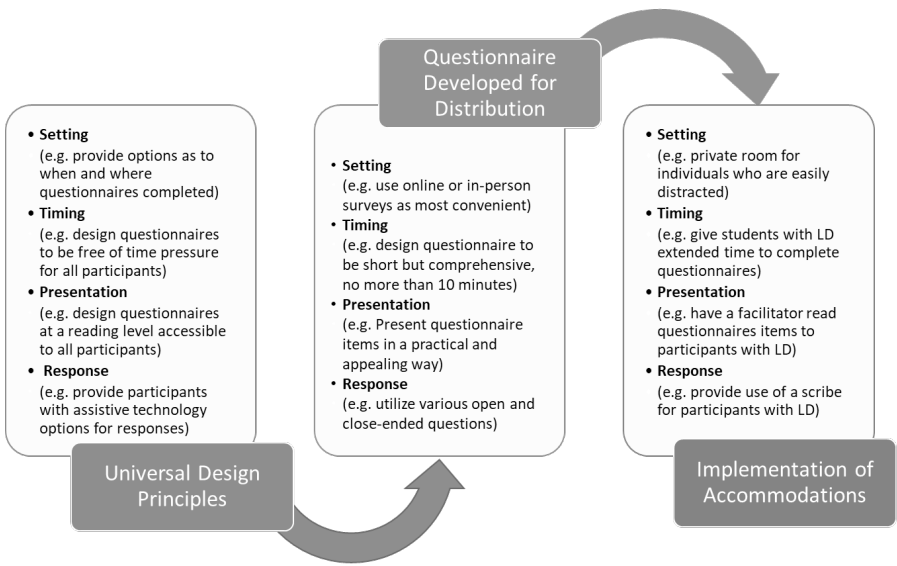

Figure 1. **Considerations for Questionnaire Design with Universal Design and Accommodations**

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