

Universal Design for Learning (UDL) as a Lever for Inclusive and Accessible Data Collection

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Abstract

As the creators of the Universal Design for Learning (UDL) framework, CAST has long applied UDL principles to engage research participants and design inclusive data collection processes, though these practices have not previously been systematically documented. This analysis examines how intentionally embedding UDL into research design can increase participation, improve participant experience, and produce richer, more meaningful data for research and innovation.

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Introduction:

Why this Paper?

And Why Now?

As the creators of the Universal Design for Learning (UDL) framework and leaders in its implementation, CAST has a long history of working at the intersection of accessibility, assessment, and educational technology design. CAST collaborated with multiple K-12 education partners to embed UDL principles and accessibility features into innovative assessments, assessment platforms, and curriculum portfolios. Through a community of practice and targeted supports—including needs assessments, coaching, and guidance on inclusive design—CAST worked with teams of designers and developers to internalize best practices in the UDL framework and in accessibility standards aligned to Web Content Accessibility Guidelines (WCAG). Across this project, CAST explored how emerging technologies, including Generative AI, can be leveraged responsibly to expand access, reduce bias, and improve the usefulness of assessments for every learner.

As part of this work, CAST conducted a study exploring the experiences and perspectives of district leaders and assistive technology (AT) users regarding procurement, technology design, accessibility, and UDL. This study offered CAST the opportunity to not only share participants' experiences and perspectives, but also to share the ways in which we embedded a UDL lens into the data collection process. CAST has consistently leveraged UDL as a mechanism for collecting data and engaging research participants. However, prior to this study, CAST had not intentionally documented these approaches or systematically examined how UDL-informed research practices influence participant experiences or the quality of the data generated.

Thus we approached this study with two goals in mind: to explicitly examine what participants shared as well as how the design of the research process itself shaped participation. [Designing Assistive Technology That Works in Schools: Lessons from the Field](#) explores the “what” of the study’s findings by synthesizing the feedback of district leaders and AT users. This white paper offers a window into the “how” of a UDL-informed data collection process and explores the question:



How can Universal Design for Learning be embedded throughout the data collection process to increase participation, reduce barriers, and generate richer, more meaningful data?

Rather than treating accessibility as a set of accommodations added after the fact, the research team intentionally designed every stage of the data collection experience to anticipate participant variability by providing multiple options for engaging with questions, contributing ideas, interacting with others, and reflecting on their experiences.

This white paper examines the specific ways the research team applied UDL to reduce barriers and increase access for participants—as well as the resulting impact on participant engagement, accessibility, and the quality of data collected. By documenting both the strengths and remaining challenges of a UDL-informed data collection process, this analysis positions UDL as a practical and actionable framework for designing research that extends beyond access to support ethical participation, methodological rigor, and meaningful collaboration. In doing so, this white paper offers guidance for researchers, designers, and organizations seeking to embed inclusive and participatory practices throughout research, co-design, and educational technology development.



CAST's work is part of a broader and growing conversation among researchers who are reexamining traditional research practices and exploring more inclusive, participatory, and accessible approaches to inquiry.

This paper is not intended to present a definitive model or a final set of methods. Rather, it offers a documented example from practice and invites dialogue with researchers across disciplines about how UDL might be leveraged more proactively throughout the research process. By sharing both the strengths and limitations of this approach, CAST seeks to encourage further experimentation, critique, and collaborative learning about the role UDL can play in expanding participation, redistributing agency, and strengthening the relevance and rigor of research.

Findings are organized across four analytic themes.

- 1. UDL Participation Design:** The first theme examines UDL-aligned participation architecture embedded in the research design.
- 2. Participant Experience Outcomes:** The second theme centers participant experience outcomes, including perceived accessibility, autonomy, psychological value, and opportunities to learn from others' perspectives.
- 3. Data Quality Outcomes:** The third theme focuses on data quality outcomes, emphasizing depth of inclusion and participant-initiated requests for continued engagement.
- 4. Implementation Friction & Ethical Learning:** The final theme addresses implementation friction and ethical learning, documenting both the support required to participate and the residual barriers that persisted despite intentional design.

Inclusive Research Design & UDL

Traditional research methods often assume that participants can engage in the research process in similar ways—reading the same materials, responding within the same timeframes, communicating their ideas through the same modalities, and participating in the same formats. Yet, these approaches can unintentionally create barriers that limit who participates, how individuals contribute, and whose perspectives are ultimately represented in the findings. Researchers in disability studies, inclusive methodologies, and crip methodologies have increasingly challenged these assumptions, arguing that research designs themselves can create exclusion when they privilege particular forms of communication, participation, or knowledge production (Castrodale, 2018; Kerschbaum & Price, 2017; Lester & Nusbaum, 2018; Price & Kerschbaum, 2016; Sarchet & Daley, 2026; Teachman, et al., 2018). Rather than asking participants to adapt to a fixed research design, inclusive data collection emphasizes flexibility, accessibility, and participant agency.

[Universal Design for Learning \(UDL\)](#) offers a framework for designing more inclusive and accessible experiences for research participants (Meyer & Rose, 2005; Meyer et al., 2025). Drawing from research in neuroscience, the learning sciences, cognitive psychology, disability studies, inclusive education, and asset-based pedagogies, the UDL framework is grounded in three principles: design multiple means of engagement, design multiple means of representation, and design multiple means of action and expression (Meyer & Rose, 2005; Meyer et al., 2025). CAST developed the [UDL Guidelines](#) to support educators, researchers,

educational technology developers, assessment developers, and other members of the education community to apply these three principles to practice (CAST, 2024). The Guidelines are broad enough to guide the design of any learning environment, including data collection processes. Research teams can leverage the Guidelines to anticipate variability among study participants and design data collection experiences that reduce barriers, increase access, and create more meaningful engagement in the research process.

Across federal, state, and local research partnerships, CAST researchers routinely incorporate UDL-informed design approaches into interviews, focus groups, co-design sessions, and other participatory research activities. Examples include:

- [Leveraging UDL to co-design with rural youth](#)
- [Leveraging UDL to co-design national adult education modules](#)

- [Co-designing a multi-generational maker space with residents in affordable housing](#)
- [Circle Up: Integrating Academic, Social & Emotional Learning through co-design and collaboration](#)

This white paper seeks to make explicit the ways that researchers can leverage UDL to reduce barriers and support meaningful participation.

Methods

Participants

A purposive sampling strategy was used to connect with two different groups of participants:

1) adults and young adults (over 18 years old) who use a range of assistive technologies for communication, navigation, access, and/or expression (screen readers, AAC, alternative input devices, etc.) in educational or workplace settings, and 2) school administrators and school leaders who purchase AT (from AT for individual students to AT across the district), manage accessibility, or design digital assessments.

A total of 24 participants were recruited for this study: 8 participants were AT users and 16 participants were district leaders. Participants represented a wide range of ages, from 18 to over 65 years old. Participants reported a wide range of self-identified identities. Responses included individuals identifying as female, male, cis-gendered, heterosexual, Hispanic, Black, White, Caucasian, Native American, autistic, neurodivergent, blind, visually impaired, and individuals with cerebral palsy, ADHD, and other disabilities. Several participants described multiple and intersecting

identities, including disability status alongside gender, race, or age. These descriptions were self-reported and voluntary.

Geographically, participants were located across at least fifteen U.S. states, including Arizona, California, Massachusetts, Minnesota, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Texas, Utah, and Washington. Utah represented the largest single state group (20.8 percent, n=5), with remaining participants distributed across other states.

Finally, participants represented a broad range of professional contexts and roles. Educational settings included early childhood, elementary, middle school, high school, adult education, and college or university contexts. Leadership roles included district leadership (37.5 percent, n=9) and state leadership (4.2 percent, n=1). Participants identified roles in workforce development, after-school and community-based programs, advocacy organizations, business or nonprofit organizations, self-employment, and student roles.

Data Collection

Participation Options

Initially, our research team planned to use focus groups as the sole method of data collection to explore district leaders' and AT users' perspectives and lived experiences. Focus groups allowed participants to build on one another's experiences, surface areas of consensus and disagreement, and collectively generate insights that may not emerge through individual interviews. The collaborative nature of focus groups also provided an ideal setting for examining how UDL could support multiple means of participation, communication, reflection, and engagement throughout the process. However, applying a UDL lens prompted us to consider the potential barriers associated with relying on focus groups as the only format. For example, some participants may not feel comfortable sharing their ideas in a group setting, particularly when meeting individuals for

the first time. Others may prefer or require additional time to reflect on questions and compose responses, while some may be unable to participate in a synchronous focus group due to scheduling constraints.

Recognizing these potential barriers led us to expand our data collection approach to provide multiple **options for participation** for sharing experiences:

1. participating in a virtual focus group
2. participating in a virtual interview, or
3. documenting their responses asynchronously via a “Home Base” document.

The **goals** of each option were the same:

1. to explore all participants’ perspectives on accessibility, barriers, and UDL in educational technology,
2. to explore AT users’ experiences and perspectives using AT and the success and barriers they encounter, and
3. to explore administrators’ and school leaders’ perspectives and experiences on purchasing AT, managing accessibility, and designing digital assessments.

Each option was designed through a UDL lens, embedding options for engagement, representation, and action and expression.

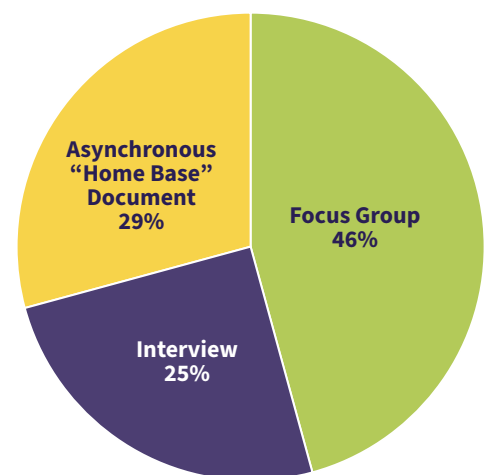
Virtual Focus Groups: The focus group option was designed to offer a shared experience where participants could not only contribute their own ideas but also learn from the ideas of other participants. Focus groups consisted of 3-5 participants and lasted approximately 90 minutes. Focus groups were video-recorded and documented via fieldnotes. During the focus groups, a “home base” document was available for participants to record (via text, images, video, etc.) any ideas that they wanted to share. 46% of participants (n=11) selected this option.

Virtual Interviews: The interview option was designed to offer a more individualized, flexible opportunity for participants—particularly those preferring one-on-one discussion—to share their experiences and reflections. Interviews were designed to last approximately 30-60 minutes. The interviews were video-recorded and documented via fieldnotes. Similar to the focus group option, a “home base” document was available for participants to record ideas. 25% of participants (n=6) selected this option.

Asynchronous “Home Base” document: The “Home Base” option was designed to offer an asynchronous opportunity to respond to the same questions posed in the focus groups and interviews via a range of modalities. Participants could choose to write/type or add audio/video to an accessible “Home base” document. Participants were encouraged to use the mode of communication that worked best for them. 29% of participants (n=11) selected this option.

Table 1. Participant Selection of Data Collection Options

Value	Percentage	Count
Focus Group	45.8%	11
Interview	25.0%	6
Asynchronous “Home Base” Document	29.2%	7
Totals	100%	24



Post-Participation Feedback Survey

After participants engaged in the focus group, interview, or asynchronous option, they completed a post-participation feedback survey to share their experiences with the data collection process. The survey was created using an accessible survey design tool and was designed to take participants approximately 10 minutes to complete. The survey included both qualitative prompts and quantitative Likert-scale items. The survey asked for demographic information and explored participants' experiences with the data collection option they selected. Specifically, the survey was designed to uncover participants' perspectives on the UDL features embedded into the design of the focus group, interview, and asynchronous "Home Base" document options and the ways these features impacted their participation.

Data Analysis

To examine how UDL can be embedded throughout the data collection process to increase participation, reduce barriers, and generate richer, more meaningful data, we examined both the participants' responses to the post-participation feedback survey as well as perspectives on the data collection experience they may have offered via the focus group, interview, or asynchronous option. Using both an open coding strategy (Saldaña, 2016) as well as an etic coding strategy (Maxwell, 2013) based on key themes in the literature, we focused on how specific UDL-aligned design features—such as advance access to materials, multiple channels for expression, and flexible pacing—shaped participants' ability and willingness to engage meaningfully. Rather than treating accessibility as a binary condition or technical checklist, the analysis foregrounds participant-reported experiences of access, autonomy, engagement, and value, alongside observable indicators of participation depth, narrative richness, and sustained engagement.

To establish the trustworthiness of our data—both the data from our larger study as well as this more focused study on participants’ experiences with the data collection process— we engaged in “member checking” to test our emerging themes with study participants (Lincoln & Guba, 1985). We shared themes along with example

illustrative quotes and asked participants for their feedback to ensure these themes accurately reflected their lived experiences and perspectives. These emerging themes were shared via an accessible document to ensure that participants could access the text, and participants could share their feedback via multiple modes through email.

Mapping the Design of Data Collection Options to the UDL Framework

The data collection options offered to participants were designed to embed the three principles of UDL—options for engagement, representation, and action and expression—in order to reduce barriers and increase access to participating and sharing perspectives. UDL was intentionally applied not as isolated strategies but as a coherent research design system that includes features such as: choice in participation format, advanced access to materials, flexible pacing, multiple expression pathways, and sustained opportunities for collective reflection.

These tables illustrate how the CAST research team operationalized the UDL framework to strengthen both participant experience and methodological rigor, shifting research practice from extractive data collection toward inclusive, participatory inquiry that resulted in more robust and useful data.

Table 1. UDL Features Embedded into the Pre-Engagement Phase

Data Collection Design Element	UDL Principle	How the Design Aligns
Choice of data collection option: Flexible approaches and timing (90-min focus group; 30-min 1:1; fully asynchronous written/typed/ audio/video feedback)	Multiple Means of Engagement	Participants chose how to engage based on comfort, energy, schedule, and confidence. Offering multiple participation pathways reduced pressure and supported sustained engagement by allowing participants to select the format that worked best for them.
Registration form to identify any additional accessibility supports needed	Multiple Means of Engagement, Multiple Means of Representation	Inviting participants to identify access needs in advance reduced uncertainty and anxiety, and engagement; all requests were accounted for through the proactive use of UDL.
Shared questions in advance (Home Base Google Doc) provided at least 72 hours ahead with agenda and consent materials	Multiple Means of Representation	Advance access to consent materials and questions supported comprehension, reduced cognitive load, and allowed participants to process information at their own pace. Participants could review questions, note initial thoughts, or add questions ahead of time.
Assisted completion of consent when requested	Multiple Means of Representation, Multiple Means of Action and Expression	Consent forms were fully accessible, allowing participants to use text-to-speech, voice-to-text, typed responses, or handwritten signatures that could be scanned. Assistance was provided as requested in accordance with regulations, reflecting UDL's focus on goal-directed participation rather than independence for its own sake.

Table 2. During Interviews and Focus Group

Data Collection Design Element	UDL Principle	How the Design Aligns
Flexible ways to share (verbal responses, written reflections in Home Base, Zoom chat contributions)	Multiple Means of Action and Expression	Participants could contribute using spoken language, typing, or written reflection—before, during, or after sessions—ensuring expression was not constrained by a single communication mode.
Pre-loaded and post-session contributions to Home Base	Multiple Means of Action and Expression	Participants could arrive with prepared responses already entered in the Home Base or add reflections after the session, supporting varied processing speeds and deeper reflection.
At the start of the session facilitated identified available supports (captions, interpreters, AAC use)	Multiple Means of Representation, Multiple Means of Action and Expression	Facilitators ensured participants were aware of how to access tools, supporting full participation from the outset.
Pacing supports and verbal check-ins (“Would you like a moment to think about that?”)	Multiple Means of Engagement	Explicit wait time and processing checks supported executive functioning and reduced time-based pressure, particularly for participants using AAC or requiring additional processing time.
Shared Home Base projected and updated in real time	Multiple Means of Representation	Real-time visual representation of group ideas supported shared understanding, memory, and comprehension, while allowing participants to type or comment directly in the document or chat.

Table 3. Post-Engagement Phase

Data Collection Design Element	UDL Principle	How the Design Aligns
Fully accessible UDL post-participation feedback survey with flexible completion timing	Multiple Means of Representation, Multiple Means of Action and Expression	Survey could be read aloud by a screen reader, and participants could respond via typing or voice-to-text. Participants could complete the survey at the end of their data collection session, or later. In three cases, participants requested real-time assistance from CAST researchers to complete surveys, supporting expression without reducing autonomy.
Extended reflection window (Home Base open for 7 days)	Multiple Means of Engagement, Multiple Means of Action and Expression	Asynchronous access allowed participants to revisit, expand, or clarify contributions. All additions were timestamped and included in analysis, supporting deeper processing and sustained engagement.
Invitation for continued participation and feedback on findings	Multiple Means of Engagement	Participants were invited to review findings and provide feedback on analysis, reinforcing relevance, agency, and long-term engagement beyond a single data-collection event.

Thematic Analysis



Theme 1: UDL Participation Design

This subsection examines the ways UDL was intentionally embedded into the design of the data collection options and how participants perceived this design. UDL was applied to reduce barriers to participation, expand access to contribution, and support equitable engagement across participant groups. Analysis draws on both quantitative survey responses and qualitative reflections related to how participants experienced the design of the data collection process itself.

Advance Access and Preparation Supports

Advance access and preparation supports design features that provide participants with early access to materials, clear expectations, and information about the goals of the research prior to active participation. Drawing from the UDL principles of multiple means of engagement, representation, and action and expression, these supports were intended to reduce barriers related to anxiety and cognitive load as well as to support more equitable participation across communication and processing needs.

Evidence for this subcode emerged first through participant responses on the registration form, where participants were invited to identify any accessible supports they needed in order to participate. Participants

articulated specific and varied needs related to access and preparation. These included requests for **“24 point font for anything I need to read,” “screen reader-compatible materials,”** and forms that could be completed digitally, with one participant noting,

“I would need any forms to be able to be filled out by typing into them. I also use the built-in Apple speak selection to help me read documents.”

Participants also requested **“extra processing time please,”** noted that **“it does take me longer to type my responses,”** and asked that questions be sent **“at your earliest convenience.”**

Additional responses highlighted communication and access needs, including

“I use an AAC device and I need more time to compose my messages on my AAC device,” and requests for “captions if possible.”

These registration responses illustrate that **advance access and preparation were not abstract preferences, but concrete prerequisites for participation**. Qualitative data from the post-participation survey further reinforced the importance of these supports. Participants described how receiving materials ahead of time supported confidence and readiness to contribute.

“Although I serve as a district leader, I still have anxiety if I don’t feel competent and knowledgeable in what I can bring to the table. Having the materials ahead of time allowed me to collect my thoughts and feel that I would be able to contribute something meaningful.”

Another participant reiterated the connection between processing needs and preparation, stating,

“I process things slowly, so it’s helpful for me to sort out thoughts on paper before trying to articulate it.”

Participants also emphasized the importance of clarity and transparency, reflecting,

“It was important to me to know what the goal of the project was and what was expected of me,” while another noted, “I was very happy with the clear expectations.”

Several participants explicitly linked advance access to accessibility, with one stating,

“I appreciated that the materials were sent in advance in an accessible format.”

Finally, participants contextualized these supports by contrasting them with common barriers they routinely encounter. One

participant stated that there were no barriers in this study and **identified typical barriers as: “inaccessible materials, materials not sent in advance, or expectation to use Zoom features that are hard to use with a screen**

reader, while still listening to the people in the meeting.” This contrast underscores the role of advance access and preparation supports in removing barriers that often limit participation.

Multiple Expression Channels

Multiple expression channels refer to the availability of diverse modes through which participants could contribute to the research process, including spoken responses, written or typed input, and asynchronous contributions through the shared “Home Base” document. This subcode aligns with UDL principles related to multiple means of action and expression and emphasizes participant choice in how ideas are communicated.



To learn more about participants’ ideas shared via these multiple modes, please explore our related white paper that shares findings from the broader study: [“Designing Assistive Technology That Works in Schools: Lessons from the Field.”](#)

Quantitative findings indicate that 91.7 percent of participants identified having multiple ways to participate and 79.2 percent identified having multiple options for how to respond as important.¹ Qualitative data provide concrete examples of how these options functioned in practice. For example, in three cases, participants asked researchers to read the consent form aloud. In two cases, participants asked researchers to type their oral responses to survey questions. In one instance, the interviewer read the consent form aloud and received documented permission from the participant to sign on their behalf. These interactions illustrate how expression flexibility extended beyond

¹ While these results are encouraging, they may underestimate participants’ positive experiences. One participant consistently selected “strongly disagree” on survey items despite providing highly positive qualitative feedback. Given this discrepancy and the absence of corresponding negative comments, we believe the participant may have unintentionally reversed the response scale, a known issue in survey design.

formal participation modes to include responsive support during consent and data collection.

Participants frequently emphasized that the value of multiple expression channels lay in the ability to respond in ways that worked for them, rather than in the speed or format of response. One participant reflected,

“I think giving multiple ways to participate eliminated the barriers,”

while another participant noted,

“For me it wasn’t so much time to respond but being able to respond in a way that worked for me.”

Others described **moving fluidly across modalities**, such as being able to **“answer in the chat or on the Home Base document for one question”** and **“use my voice for another.”**

Several participants highlighted how **choice reduced pressure and lowered participation barriers**. One participant stated, **“I loved not having the pressure of falling into one ‘expectation’.”** Another noted that

“sometimes it’s hard to type so to share verbally was nice,” while another shared a preference for auditory participation, stating, **“I prefer to do everything in an auditory fashion.”** Participants also described valuing the ability to alternate between speaking and writing, with one noting,

“I like how sometimes I am able to talk, and other times I am able to think and reflect by writing.”

The **availability of multiple formats also supported differences in cognitive processing and depth of response**. One participant described using the microphone when thoughts came easily and using typed responses to share **“deeper thoughts, and pictures.”** Another reflected that the Home Base document allowed them to engage more intentionally, stating,

“The ‘Home Base’ was a game changer. I tend to babble a lot more if the expectation is to just talk off the cuff.”

Similarly, participants noted that asynchronous writing made it easier to reflect, with one stating,

“It was easier to write asynchronously in the ‘Home Base’ document.”

When identifying the “most important” design feature responses strongly reinforced the centrality of **multiple expression channels** as the most important participation support. Nearly half of participants, 45.8 percent, identified having multiple ways to participate, such as choosing between a focus group, one-on-one interview, or asynchronous Home Base contribution, as the single most important feature. An additional 33.3 percent identified having multiple options for how to respond within a session, such as speaking, using chat, or contributing written or audio responses, as most important.

These responses indicate that when asked to prioritize a single feature, the majority of participants selected options directly related to **choice in participation mode and expression**. This finding aligns with earlier qualitative evidence describing the value of being able to move across modalities

and engage in ways that felt effective and comfortable. The write-in response further supports this interpretation, with one participant emphasizing that open ended questions and flexible response formats allowed them to express themselves fully, even when responses did not follow a strict question structure, and that this approach was **“very respectful of the way I presented my answers.”**

Pacing and Time Flexibility

Pacing and time flexibility refer to design features that allowed participants to engage with the research process at a pace aligned with their processing needs, communication preferences, schedules, and available energy. Drawing from the UDL principles of multiple means of action and expression and multiple means of engagement, these features included opportunities to respond asynchronously, flexibility in when and how responses were shared, and sufficient time to reflect before contributing.

Participants consistently described pacing flexibility as central to their ability to participate meaningfully. Several participants emphasized the importance of being able to engage at their own pace in order to organize thoughts before responding. One participant noted,

“I process things slowly, so it’s helpful for me to sort out thoughts on paper before trying to articulate it.”

Another shared that having time to reflect allowed them to **“collect my thoughts, listen to others, and respond in a way that felt natural...”**

Flexibility was also closely tied to participants’ schedules, energy levels, and access to support. Participants described the ability to choose when to participate as critical, particularly given competing responsibilities. One participant stated,

“I was able to choose what works best for me and how it best fit my schedule.”

Others echoed this sentiment, noting that flexibility allowed them to **“find the time when I had the energy, time and support to**

work on it,” and emphasizing the importance of **“flexibility for my schedule and energy.”**

Several participants explicitly linked flexibility to feasibility, with one stating,

“Without the flexibility, I likely would not have been able to participate.”

Participants also highlighted how pacing flexibility supported the quality of their contributions. One participant reflected that the open-ended nature of the questions allowed them to share information even when responses did not align neatly with a single prompt, stating that the design allowed them to express themselves fully. Another participant emphasized that the ability to respond flexibly allowed them to complete the task **“at my own pace and around my busy schedule,”** which supported more thoughtful engagement.

In addition to logistical and cognitive considerations, participants described emotional and social dimensions of pacing flexibility. One participant noted that flexibility helped address broader barriers related to communication and context, stating that **“gender norms and written language are**

often a barrier for me,” and that the study design and facilitation supported **“equal representation and participation from all those present.”**

Overall, **advanced access and preparation supports, multiple expression channels, and flexible pacing and timing** served to create an accessible experience. Quantitative data from the survey revealed that 87.5 percent of participants agreed or strongly agreed that the design of the study made it easy to participate. Similarly, 95.8 percent of participants agreed or strongly agreed that they had the flexibility needed to share their ideas. For the item “The materials and technology were accessible for me,” 86.9 percent of participants selected agree or strongly agree. Participants also reported strong agreement that facilitation

supported inclusive engagement, with 91.7 percent agreeing or strongly agreeing that the facilitator encouraged multiple ways to engage.²

Qualitative data also highlighted this overall accessibility of the experience. Participants consistently described the process as accessible and easy to navigate. Several survey responses explicitly referenced the absence of barriers, with one participant stating, **“It was my first time [being in a study] and it was very accessible and easy to participate.”** Another participant similarly noted, **“I feel like this study experience removed any barriers I would have had.”**

² As noted above, these results may underestimate participants’ positive experiences. One participant selected “strongly disagree” across survey items despite providing consistently positive qualitative feedback, suggesting the response scale may have been unintentionally reversed.



Theme 2: Participant Experience Outcomes

This section examines how UDL-aligned participation options shaped participants’ experiences of the research process. While the prior section focused on the design of participation, this domain centers participant-reported outcomes related to accessibility, autonomy, engagement, and the experience of hearing and learning from others. Together, these outcomes provide insight into how inclusive research design influences not only participation mechanics, but participants’ sense of belonging, trust, and willingness to engage meaningfully.

Analysis draws primarily on post-participation survey responses, including both Likert-scale items and open-ended reflections, supplemented by qualitative evidence from focus groups, one-on-one interviews, Zoom chat interactions, and asynchronous written contributions. Rather than treating participant experience as a secondary or affective outcome, this analysis positions experience as a core indicator of ethical and methodologically sound participatory research.

Autonomy and Agency

Autonomy and agency refer to participants' sense of control over how, when, and in what ways they engaged in the research process. This subcode captures experiences of choice, comfort, and self-advocacy, and links UDL-aligned research design to ethical research practice by examining how power and decision-making were distributed across participation options.

In addition to sharing how choosing ways to participate and even having flexible options in the moment increased participants' ability

to engage, participants explicitly linked autonomy to comfort. One participant shared,

"I really appreciated being able to respond in a way that felt comfortable for me."

This emphasis on comfort reflects the role of choice in reducing pressure and supporting participants to engage authentically, rather than conforming to a single expected mode of participation.

Several participants framed autonomy as a core value, connecting their experience in this study to broader educational principles. One participant noted,

"I think that it offers 'voice and choice', which is important in education."

This statement situates autonomy not only as a personal preference, but as a pedagogical and ethical commitment that participants recognized and valued within the research design.

Engagement

In this study, we use the code “engagement” to refer to participants’ sense of being respected, heard, and meaningfully included within the research process. This subcode captures participant-reported experiences related to trust, safety, and willingness to engage honestly, without analyzing the substantive content of participants’ feedback. Engagement is treated as both an ethical outcome and a condition that supports meaningful participation.

Quantitative survey results reveal strong feelings of engagement among participants. For the statement “I felt that my input was valued and respected,” 87.5 percent of participants selected agree or strongly agree. Participants also expressed strong willingness to re-engage in similarly designed research activities: 87.5 percent agreed or strongly agreed that they would participate again, and 90.9 percent agreed or strongly agreed that they would recommend participation in this kind of study to others.³

³ As noted above, these results may underestimate participants’ positive experiences. One participant selected “strongly disagree” across survey items despite providing consistently positive qualitative feedback, suggesting the response scale may have been unintentionally reversed.

Qualitative survey responses provide depth and context for these quantitative patterns. Participants frequently described feeling respected and valued for what they contributed. One participant stated,

“I felt valued for what I had to offer, without the pressure of having to say the ‘right thing.’”

Another similarly reflected, **“Because I was able to get all of the information I thought you wanted to you in a way that made it easy for me. I felt respected and I felt valued.”** A third participant reinforced this perception, noting, **“The information I shared you seemed to value.”**

Participants emphasized that the research environment was respectful of individual communication styles and ways of engaging. One participant described the experience as **“very respectful of the way I presented my answers,”** while another shared, **“I loved not having the pressure of falling into one ‘expectation.’”** Further, engagement was often described in relational terms,

emphasizing shared experience, collaboration, and mutual listening. One participant expressed appreciation by stating, **“Thank you for allowing us equally to share our lived experiences and listen to each other.”** Another reflected on the collaborative nature of the process, noting,

“Yeah, it was nice to interact directly in the document. It felt more relaxed and easier than I expected — like we were all building something together at the same time.”

Others echoed this sentiment, stating, **“It was enjoyable and I really liked being able to hear others’ views and experience,”** and **“I also appreciate listening to others and reading their perspectives.”**

Several participants highlighted how the structure of the research supported engagement by reducing intimidation and pressure. One participant shared, **“It was a smaller ‘focus group’ than I expected with just one other person, but made it easier to share and less intimidating.”** Another reflected,

“This is my first time participating in a research activity and it was much more laid back and personable than I expected. I enjoyed it very much.”

Additional responses reinforced this experience, including **“It was a fantastic experience! I was made to feel very comfortable and would recommend this to others,”** and **“Love it.”**

Participants also linked engagement to learning, reflection, and future engagement. One participant shared, **“What a lovely and dedicated time for sharing and learning. This time helped me to reflect more deeply on the things we are doing well and the things we want to do better. Thank you!”** Another noted, **“I enjoyed myself. Learned a ton.”** Others expressed interest in continued participation, stating,

“I am looking forward to having more of these kinds of conversations in my district.”

Another reflected more broadly,

“This should be the standard for how we engage each other in collaborative and learning opportunities.”

One participant summarized the impact of the design by stating, **“It continues to demonstrate how we can have meaningful conversations that allow participants to engage in the way that feels most effective and comfortable for them. It lowers barriers and creates much fuller and more interesting conversations.”**

Learning From Others’ Voices

Learning from others’ voices refers to the ways participants who selected the focus group option valued the opportunity to learn from perspectives shared by others during the research process. This subcode captures the representational dimension of participation and highlights how UDL-aligned design supported the visibility and sharing of a diversity of perspectives across age, identity, geographic location, professional role, and experience level.

Qualitative survey responses illustrate how the remarkable diversity of participants in terms of role, years of professional experience, and multiple and intersecting identities translated into meaningful opportunities for learning from others. Several participants explicitly emphasized the importance of cross-perspective engagement, noting that **“hearing from different stakeholders and their perspectives is SO important.”** Others described the collaborative nature of the experience, with one participant reflecting that it felt

“like we were all building something together at the same time.”

Participants frequently referenced the value of listening to others’ experiences. One participant stated, **“I really liked being able to hear others’ views and experience,”** while another shared,

“I learned a lot and really enjoyed being able to hear others’ perspectives!”

A similar sentiment was expressed by a participant who noted, **“I enjoyed my self. Learned a ton.”**

Several participants described how learning from others’ voices supported reflection and professional growth. One participant stated, **“I think the experience was exactly what I expected, and I am grateful that it gave me dedicated time to reflect on these questions and consider how we can continue improving and moving our district forward.”** Another participant reflected on gaps in their own perspective, stating, **“I just wish I had more knowledge**

and perspectives of disabled people and what they really need. It shows me just how much awareness our district is lacking and coming from a General Ed teacher background, I could grow and benefit a lot in this area in order to help students.”

These reflections underscore how the combination of varied participant identities and experiences and multiple means of representation supported not only access to participation, but access to perspectives that participants could learn from, reflect on, and carry forward into their work.



Theme 3: Data Quality Outcomes

This section examines how UDL-aligned research design influenced the quality of the data generated through the data collection process. While Sections 1 and 2 focused on participation structures and participant experience, this domain centers on methodological outcomes—specifically the depth, richness, and sustainability of participant contributions. Rather than treating data quality as a function of response volume or completion rates alone, this analysis foregrounds indicators of depth of inclusion and evidence of sustained engagement.

Findings in this section draw on qualitative artifacts across participation modes, including extended written survey responses, focus group and interview transcripts, Zoom chat interactions, and contributions to the home base. Together, these data sources allow for examination of how design decisions shaped not only who participated, but how participants contributed and whether they demonstrated interest in continued engagement.

Depth of Response

Depth of response refers to the extent to which participant contributions demonstrate detail, specificity, narrative quality, and willingness to share personal experiences. This subcode emphasizes qualitative richness, such as examples, emotion, and nuance, rather than response length or volume alone. Depth of response is treated as a key methodological indicator, reflecting the degree to which participants felt able and motivated to engage meaningfully in the research process.

Across data sources, participants provided reflective and experience-based contributions that extended beyond surface-level responses. Many participants shared personal narratives that contextualized their perspectives, including moments of hesitation, growth, and self-reflection. One participant described an initial uncertainty about belonging in the study, stating, **“I almost didn’t participate at first because this is probably only for classroom teachers. But I thought to myself wait a minute I’ve been involved in UDL all of my life and I thought what the heck I am going to go for it and I am so glad I did.”**

This reflection illustrates both vulnerability and narrative depth, as well as how the research design supported participants in reframing their role and choosing to engage.

Participants also articulated how the structure of the research process supported more substantive and nuanced dialogue. One participant reflected that the design **“lowers barriers and creates much fuller and more interesting conversations.”** This statement aligns with observable patterns in the data, where participants moved beyond brief responses to share layered reflections, connect ideas, and situate their feedback within broader professional and personal contexts.

Depth of response was further evident in participants’ willingness to reflect on their own practice and roles. One participant noted,

“Thank you for asking me to participate, as it got me thinking about my own role and how I can do more to bring UDL to students.”

Such reflections demonstrate that participants were not only responding to prompts, but engaging in sensemaking that extended beyond the immediate data collection context.

Importantly, depth of response was observed across participation modes. Extended written responses, contributions to the home base, and synchronous discussions all contained examples of narrative detail, emotional resonance, and thoughtful elaboration. Participants frequently integrated personal experience, professional insight, and reflection on others' perspectives, suggesting that the design supported intentional and meaningful engagement rather than reactive or minimal participation.

Requests for Continued Participation and Engagement

Requests for continued participation refer to explicit expressions of interest in providing additional feedback, engaging in future research activities, or remaining connected to CAST's research efforts. This subcode includes only clear affirmative expressions of interest and excludes tentative or ambiguous responses. Analytically, such requests are

treated as evidence of sustained engagement and investment in both the research process and its outcomes.

Across qualitative survey responses, participants articulated a clear desire to remain engaged beyond their initial participation. Several participants expressed interest in reviewing or contributing to the use of findings. One participant stated, **"I appreciate this opportunity, and I look forward to seeing the final product that is shared with vendors."** Another participant similarly noted, **"I would like to see the data and even member check it for you if that is something you would like."** These responses indicate a willingness to engage in later stages of the research process, including validation and dissemination.

Other participants expressed interest in supporting broader capacity-building efforts connected to the research. One participant wrote,

"How do we help others build these [accessibility] skills? I wanna help!"

This statement, repeated across responses, reflects an orientation toward action and collaboration rather than passive consumption of findings. Such expressions suggest that participants viewed the research as relevant to ongoing professional learning and systems-level improvement.

Participants also framed their interest in continued engagement in terms of alignment with CAST's mission and approach. One participant stated, **“What CAST does is SO important. I love that the decisions being talked about for us, include us.”** Another echoed this sentiment, writing simply, **“What**

CAST does is SO important.” These responses indicate that participants' desire to remain engaged was connected to feeling included in meaningful decision-making processes.

Several responses expressed appreciation for the research itself and the opportunity to contribute. Participants wrote, **“Thank you for your time and thoughtful questions!”** and **“Thank you for conducting this much needed research.”** While brief, these responses represent affirmative engagement and signal value placed on the research process.



Theme 4: Implementation Friction & Ethical Learning

This final section examines implementation friction and ethical learning that emerged through the use of UDL as a guiding framework for research design. While earlier sections demonstrate the benefits of UDL-aligned participation for experience and data quality, this section intentionally foregrounds the labor, limitations, and unresolved challenges involved in operationalizing inclusive research practices. By documenting both the supports required and the barriers that persisted, this analysis offers practical guidance for researchers seeking to design accessible data collection processes that are inclusive without being extractive or performative.

Design and Facilitation Time and Effort

Design and facilitation time and effort refers to the labor associated with developing accessible consent, surveys, and data collection options and provides an explicit accounting of the human effort required to operationalize UDL within research practice.

Across participation formats, researchers provided individualized support to ensure participants could meaningfully engage. This included reading consent forms aloud, assisting with the completion of consent documentation, typing responses on participants' behalf when requested, supporting navigation of survey tools or shared documents, and adjusting facilitation practices in real time. In all cases where this was done, participants gave permission for facilitators to document responses or complete procedural steps for them, highlighting the importance of relational trust, transparency, and clear communication within inclusive research settings.

This support was neither uniform nor predictable. Requests for assistance emerged organically based on participants' communication preferences, access needs,

energy levels, and familiarity with digital tools. Importantly, providing this support required sustained facilitator attention, flexibility, and judgment. Facilitators continually adapted pacing, modes of interaction, and documentation practices to align with participant needs as they arose. These adaptations represent meaningful labor that extended beyond what is typically accounted for in conventional research designs.

Providing robust participant choice also introduced tradeoffs in the structure and flow of the data collection experience. While flexible participation options expanded access and supported autonomy, they also altered some core features of traditional focus group design. For example, not all participants engaged simultaneously or through the same modalities, which reduced opportunities for synchronous dialogue and limited the extent to which facilitators could manage turn-taking, probe shared themes in real time, or observe collective group dynamics. In prioritizing access and agency, some elements of uniformity, efficiency, and comparability across sessions were intentionally relinquished.

From an implementation perspective, these findings underscore that UDL-aligned research design requires intentional planning for labor, time, and staffing. Facilitation protocols, timelines, and budgets must explicitly account for individualized support during consent, onboarding, and participation. Treating this work as invisible or incidental risks reproducing exclusion by shifting the burden of access back onto participants or facilitators without adequate structural support.

Ethically, this support reflects a shift from accommodation-based thinking toward relational responsibility. Rather than expecting participants to adapt to fixed research systems, the data collection process adapted to participants—even when doing so introduced complexity or constrained traditional research structures. This approach aligns with UDL principles while reinforcing ethical commitments to respect, autonomy, and engagement. At the same time, it highlights that inclusive research involves tradeoffs and requires deliberate decisions about what aspects of conventional design may need to be reimagined or relinquished in service of equitable participation.

Residual Barriers Despite UDL Design

Residual barriers refer to limitations that persisted despite intentional UDL-aligned design and facilitation. This subcode captures barriers that continued to constrain participation or experience, excluding non-participation unrelated to access. Analytically, documenting residual barriers is essential to avoid overstating the impact of UDL and to support iterative improvement in inclusive research design.

Ethically, naming residual barriers signals respect for participants' experiences and avoids framing inclusion as fully achieved. For the field, this transparency offers a more realistic model of inclusive research—one that balances intentional design with responsiveness, reflection, and a willingness to adapt.

Despite the use of multiple participation modes, flexible pacing, and accessible materials, some barriers remained. Participants expressed concerns about whether asynchronous or remote participation might be perceived as less valuable than in-person or synchronous engagement. This reflects broader cultural norms around

participation and legitimacy that extend beyond the design of a single study.

Several participants identified limitations related to how questions were presented. One participant noted, **“There was not easy way to access the questions auditorially or through video, that would have been helpful.”** Another echoed this expectation, stating, **“I was expecting more universal design (ie audio/video) in the question format.”** Related suggestions included, **“provide audio/video versions of the questions,”** and

“It would have been good to have the option to have all questions available as read-out-loud audio.”

These responses indicate that while materials were accessible in multiple ways, more effort is needed to explicitly identify that these options are available to all participants. Another highlighted broader time-related constraints, stating, **“Time, time, time! I am not alone, however, making sure that we not only have enough time but also building in the time to comprehensively understand and implement the accessibility tools.”**

These reflections suggest that even when flexibility is built into design, time remains a critical and unevenly distributed resource.

Energy and stamina also emerged as residual barriers. One participant shared, **“Low energy can still be a barrier for me. Built-in breaks help, and they would benefit others in the future too.”** This response highlights the importance of designing for fluctuating capacity, not only for participants with identified disabilities, but for all participants.

Social and cultural perceptions of participation further shaped participants’ experiences. One participant expressed concern that **“I worried that my input would be less valuable if I did not participate in person,”** pointing to persistent norms that privilege synchronous or in-person engagement even when alternative formats are offered. This suggests that design alone cannot fully counteract broader assumptions about legitimacy and value.

Other residual barriers were structural rather than technical. Competing professional responsibilities, limited time, and varying levels of prior knowledge shaped how participants engaged, even when access barriers were reduced. While UDL design mitigated some of these constraints, it could not fully eliminate them.

Importantly, the presence of residual barriers does not undermine the value of UDL-aligned design. Rather, it underscores the need for humility and transparency in inclusive research practice. UDL should be understood as an iterative framework that supports ongoing refinement, not as a guarantee of universal access.



Implications for EdTech and Assistive Technology Researchers

These findings suggest several implications for educational researchers, particularly those seeking to design participatory studies that are inclusive, ethical, and methodologically rigorous.

Across Sections 1–4, the analysis demonstrates that Universal Design for Learning operates most powerfully when treated not as an accommodation strategy, but as a foundational research design framework. UDL-aligned data collection options shaped who was able to engage, how participants experienced the research process, and the quality and sustainability of the data generated. At the same time, the findings underscore that inclusive research design involves real labor, ongoing decision-making, and an honest accounting of limitations.

The reflections and recommendations that follow are intended to support researchers and developers in moving beyond compliance-oriented accessibility toward inclusive, accessible research practices that center lived experience, redistribute agency, and strengthen trust. Rather than offering prescriptive rules, **these recommendations highlight design commitments and methodological considerations that can guide future research**, particularly in contexts where findings are intended to inform educational technology and assistive technology development.

By grounding these recommendations in both quantitative and qualitative evidence, this section aims to contribute to a growing body of work that positions inclusive research design as integral to ethical inquiry, valid data, and meaningful impact in the educational technology field.



1. Treat UDL as a Core Design Feature, Not an Accessibility Add-On

Reflection / Recommendation:

Researchers should conceptualize Universal Design for Learning as core research infrastructure rather than a set of accessibility features layered onto traditional methods. The findings demonstrate that when UDL informs participation structures, facilitation practices, and data collection modes from the outset, it reshapes not only who can participate, but how participants engage, contribute, and trust the process.

Implication for edtech and AT research:

Future research should explicitly document how UDL is operationalized across the full research process—recruitment, consent, data collection, analysis, and dissemination—and study its impact on both participant experience and data quality. This shifts the field away from compliance-oriented accessibility toward inclusive methodological design.



2. Design for Depth and Sustained Engagement, Not Just Participation

Reflection / Recommendation:

Inclusive research design should prioritize depth of inclusion and sustained engagement as key indicators of rigor. The study shows that UDL-aligned approaches supported narrative richness, emotional nuance, reflective sensemaking, and requests for continued participation—outcomes that extend well beyond participation rates or survey completion.

Implication for edtech and AT research:

Researchers should prioritize not only “who participated” but also how participants contributed and whether they sought to remain engaged. Future studies might intentionally track indicators such as narrative depth, participant-initiated follow-up, and interest in member checking as methodological outcomes linked to inclusive design.



3. Name Friction and Residual Barriers as Ethical Practice

Reflection / Recommendation:

Acknowledging implementation friction and residual barriers should be treated as an ethical research practice rather than a limitation to be minimized. The findings make clear that even well-designed UDL approaches do not eliminate constraints related to time, energy, representation formats, or perceived legitimacy of participation.

Implication for edtech and AT research:

Future research should systematically surface and analyze residual barriers alongside successes, particularly in studies informing product design. For assistive technology developers, this transparency provides critical insight into unmet needs—such as multimodal representation of questions or pacing supports—that may not emerge through traditional usability testing alone.



Checklist: Applying Universal Design for Learning to Inclusive Data Collection

This checklist represents our current thinking about how Universal Design for Learning (UDL) can support more inclusive and accessible data collection. It was developed from the findings of this study and informed by CAST's broader experience applying UDL to research, co-design, and participatory inquiry.

We do not view this checklist as complete or definitive. Rather, we hope it serves as a starting point for continued learning, reflection, and collaboration. As we continue to study and refine UDL-informed research practices, we expect these ideas to evolve. We invite the research community to build on this work by adapting these strategies, sharing experiences, and contributing new ideas that can help advance more inclusive, accessible, and participatory approaches to research.



Pre-Engagement: Prepare for Participant Variability

Multiple Means of Engagement

- ☐ Offer multiple ways to participate (e.g., focus group, individual interview, asynchronous option).
- ☐ Offer participants the option to select the participation format that best fits their communication preferences, schedule, comfort, and energy.
- ☐ Ask participants about any specific accommodations or preferences to reduce barriers and increase access. Work to embed these accommodations and/or preferences into the design of the data collection opportunities so they are available to all participants.
- ☐ Build sufficient time and staffing into the project to provide individualized support when needed.

Multiple Means of Representation

- ☐ Provide consent materials in accessible formats.
- ☐ Share interview or focus group questions at least several days in advance.
- ☐ Clearly communicate the purpose of the study, expectations, agenda, and participation options.
- ☐ Ensure all materials are compatible with assistive technologies.

Multiple Means of Action & Expression

- ☐ Offer participants the option to review, annotate, or prepare responses before the session.
- ☐ Provide assistance with consent or technology when requested.



During Data Collection: Design for Choice, Flexibility, and Reflection

Multiple Means of Engagement

- ☐ Offer processing time before expecting responses.
- ☐ Build in opportunities for breaks and pacing adjustments.
- ☐ Encourage participants to engage in ways that feel comfortable rather than expecting one “correct” way to participate.

Multiple Means of Representation

- ☐ Present questions using more than one modality (spoken, written, visual, and when possible audio/video).
- ☐ Make captions, interpreters, AAC supports, and other accessibility tools available from the start.
- ☐ Maintain a shared visual workspace (e.g., collaborative document or home base) that supports understanding and memory.

Multiple Means of Action & Expression

- ☐ Offer participants the option to move between communication modes throughout the session.
- ☐ Encourage participants to respond through speech, writing, chat, audio, video, images, or other preferred modalities.
- ☐ Provide opportunities to contribute before, during, and after synchronous sessions.
- ☐ Focus on the quality of participant contributions rather than the speed with which they respond.



Post-Engagement: Extend Participation Beyond the Session

Multiple Means of Engagement

- ☐ Leave opportunities open for continued reflection after the session.
- ☐ Invite participants to expand, revise, or clarify earlier responses.
- ☐ Invite participants to review emerging findings (member checking).

Multiple Means of Action & Expression

- ☐ Offer multiple ways for participants to provide feedback on their experience and suggestions for further reducing barriers and increasing access.
- ☐ Encourage continued participation if participants wish to remain engaged.

Continuous Reflection for Researchers

- Ask: Who might still experience barriers in this design?
- Document the accessibility supports provided—not only the participant demographics.
- Record implementation challenges and remaining barriers alongside successes.
- Reflect on how UDL-informed design influenced:
 - participant accessibility,
 - autonomy and agency,
 - engagement,
 - depth of responses, and
 - overall data quality.
- Treat inclusive data collection as an iterative design process that continues to evolve with participant feedback.

Conclusion & Future Research

The findings from this study reinforce that Universal Design for Learning (UDL) functions most effectively not as a collection of accessibility strategies, but as a comprehensive design framework that shapes participation, participant experience, and the quality of data generated to explore research questions. When UDL principles were intentionally embedded throughout the data collection process, participants reported greater accessibility, autonomy, and engagement, while also providing richer, more reflective contributions. These findings suggest that inclusive design influences not only who participates, but how individuals participate, what they choose to share, and the overall quality and trustworthiness of the resulting data.

At the same time, the persistence of residual barriers and the variability in participants' experiences underscore that inclusive design is an ongoing process rather than a completed state. Designing for learner variability requires continual refinement, reflection, and responsiveness to the diverse

needs, preferences, and contexts participants bring to learning, assessment, technology, and research. The findings highlight the importance of viewing accessibility as a dynamic design challenge that extends beyond compliance to encompass meaningful participation, agency, and belonging.

As educational systems increasingly rely on digital technologies, AI-enabled tools, and complex assessment ecosystems, there is an urgent need for research that places learner variability at the center of design rather than treating it as an accommodation. By advancing a research agenda grounded in UDL and participatory design, the field has the opportunity to develop educational environments, technologies, and research practices that are not only more accessible, but more equitable, responsive, and effective for all learners.



Future Research: These findings regarding inclusive and accessible data collection—as well as our broader research and collaboration with our edtech partners throughout this project—have generated numerous areas for future study to deepen and extend our work. As part of this larger project, we developed this [Research Agenda for Inclusive and Accessible Assessments and Educational Technologies](#). In this agenda, we identify key questions and areas of investigation to advance inclusive design in assessments and curricula.

Specifically, we articulate lines of inquiry in four areas: **Building Capacity around Accessible and Inclusive Assessments and Educational Technologies, Strengthening Systems around Inclusive Assessments and Educational Technologies, Designing for Learner Variability, and Expanding Inclusive and Accessible Research Design.**

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