MEASURES FOR EARLY SUCCESS

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DEVELOPING ENGAGING ED TECH PRODUCTS FOR YOUNG CHILDREN

Insights from User Testing of Assessment Tool Prototypes

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Today's educational technology (ed tech) landscape is growing at a rapid pace, particularly in the early learning arena. More companies are entering the pre-K space with learning products that make use of technology, offering interactive digital educational experiences for even the youngest of learners.[1] As ed tech continues to expand, an increasing number of districts are looking to incorporate effective technologies in their classrooms to support learning and information management, resulting in a growing need for accessible, inclusive, and user-friendly tools.[2]

Despite the surge of interest in ed tech products, some existing tools employ design features that are not aligned with the varied needs of students in today's pre-K classrooms, and products intended for young children are often developmentally inappropriate for their target audience.[3] This brief offers practical, user-tested suggestions to help ed tech developers avoid these pitfalls and design effective, engaging, and easy-to-use digital products for young children that reflect different perspectives and experiences of users. These suggestions are grounded in the real-world codesign work of the Measures for Early Success Initiative (Measures Initiative) — a project led by MDRC that brings together assessment developers, researchers, content experts, policy advisors, administrators, educators, and families to rethink how pre-K learning is assessed.[4] The involvement of children, families, and educators from groups not historically included in assessment development is central to the initiative.

In early phases of the Measures Initiative, assessment developers applied best practices to design new assessment tool prototypes for children served by public pre-K and conducted user testing on those prototypes.[5] Research methods included focus groups with families, educators, and administrators; cognitive interviews and pilot testing with children and educators; observations of educators and children using the tools in classrooms; surveys with educators; conversations with technical advisors, practice and policy advisors, and academic experts; and expert reviews of assessment content. The takeaways in this brief are distilled from assessment developers' reflections on feedback they received during user testing. Where relevant, the brief identifies revisions developers made to tools in response to user feedback. (For a more comprehensive summary of views on child assessment expressed by educators and families in focus groups in the Measures Initiative, see the MDRC report "Capturing a Child's Uniqueness: Educators' and Parents' Insights on Designing Early Childhood Assessments."[6])

The takeaways, consisting of suggestions and relevant examples, crystallize around two core design goals:[7]

Goal 1: Design products to be intuitive, engaging, and enjoyable for young children

Goal 2: Reflect experiences and perspectives that are familiar to product users

See Box 1 for a complete list of these takeaways, which are discussed in detail throughout the brief.

Because the assessment tools involved in this research were interactive digital platforms, the insights and recommendations that emerged apply not only to assessment design, but also to the design of a broader range of ed tech products. This brief provides concrete takeaways aligned with current best practices to help ed tech developers for a variety of product types center users and create more impactful products for early childhood settings.

Box 1. Suggestions for Developing Engaging Ed Tech Products for Young Children

GOAL 1. Design products to be intuitive, engaging, and enjoyable for young children

Designing Intuitive Product Features

- Include tutorials with opportunities for hands-on practice.
- Ensure instructions are brief and clear enough for children to follow independently.
- Ensure that product technical features are age appropriate.
- Include features that support children navigating tools independently.
- Include the ability to pause and save progress throughout.

Designing Enjoyable and Engaging Product Features

- Include opportunities for children to make choices.
- Include positive feedback and encouragement.
- Include fun, whimsical, or silly designs and features.
- Include a storyline to add purpose and interest.

GOAL 2. Reflect experiences and perspectives that are familiar to product users

- Embed activities in contexts familiar to the children who will be using the product.
- Include human characters in activities.

Goal 1: Design Products to Be Intuitive, Engaging, and Enjoyable for Young Children

Through working with families and educators, developers identified several strategies for ensuring that ed tech products are intuitive, engaging, and enjoyable for children. Many of these recommended strategies reinforce known best practices and provide additional support and clarity on how to implement those practices.[8] Though some strategies may seem obvious, even experienced developers saw a need to improve their implementation based on the feedback they received.

Designing Intuitive Product Features

Key pathways for ensuring that a product is intuitive — that is, that children understand how to use the product and can follow relevant instructions — are discussed below.

Include Tutorials with Opportunities for Hands-On Practice.

Young children using ed tech products will have a range of previous experience using technology and learning apps, with some having never used them. Given this range, including a tutorial with simple instructions and opportunities for children to practice using the product is helpful to ensure that children can successfully engage with the content. This step is particularly important when creating a product that will record

and report information on children's learning to ensure that the user's comfort level with the technology does not affect the results.

If a product is a tablet app, this training may teach children how to interact with a tablet — such as how to select, drag, tap, shake, or draw — using instructions and opportunities to practice. Young children may benefit from icons or other stimuli that signal how to complete an action, such as a hand moving an item across a screen to demonstrate how to drag, or response options that light up to show children what they can select from.

Examples from the Measures Initiative

Many assessment developers in the Measures Initiative developed or refined tutorials to help introduce tasks and product functions to children.

- One developer initially created a single tutorial covering a range of actions, which children had to complete before starting the assessment. The tutorial included practice items similar to what students would see on the assessment, but in a different context. Pilot testing revealed that the tutorial took too long for children to complete and that it did not prepare students well for the activities on the assessment. The developer concluded that a better approach for this tool would be to provide tutorials before each new type of activity rather than a single training at the start and to present tutorial practice items in the same context as the assessment narrative.
- Another developer observed that children exited out of a few specific activities at high rates, indicating that perhaps these activities were too difficult or confusing. The developer added animated guidance to orient children to these activities and reduce frustration.

Ensure Instructions Are Brief and Clear Enough for Children to Follow Independently.

In alignment with standard design principles to simplify complex features, instructions in ed tech products — such as audio or video tutorials — are most effective when they are brief and simple. Developers found that instructions with three or fewer steps were easiest for young children to follow. It is helpful to review activities and their associated instructions with a critical eye to be sure that instructions are as concise as possible while users understand what they are being asked to do.

Examples from the Measures Initiative

Through testing their tools with children, nearly all assessment developers in the Measures Initiative learned that some activity instructions were too long or complicated. For example:

- One assessment tool included a two-step instruction, asking children to first provide their answer and then select a check mark once they were done with the activity. The second step of selecting a check mark was particularly difficult for younger children to remember to do, but important for confirming that a child was ready to submit their response. To address this issue, the developer added an additional reminder for children to select the check mark once they were done if they did not tap it within a specified amount of time after completing the activity.
- Other developers found that children listening to instructions lost interest before the instructions were finished, or when the narration delivering the instruction was very slow. In response, these developers shortened or simplified their instructions and increased the speed of the narration.

Ensure That Product Technical Features Are Age Appropriate.

Testing and refining the technical features used in ed tech products helps ensure that the target age group can use them correctly. As noted earlier, many young children using ed tech products will not have had much or any experience using technology. Moreover, some features are difficult for children to use regardless of experience level. A particular concern, when designing ed tech products for use in early childhood, is that young children are still developing fine motor skills and may struggle with standard versions of features typically found in digital tools.

Examples from the Measures Initiative

Assessment developers learned that some of the actions required by the new tools were difficult for children to carry out and needed adjustment. For example:

- Children testing one tool had trouble using the drag gesture to move elements in the tablet interface as the developer intended, so the developer increased the size of the elements to make them easier to drag.
- Children also experienced challenges using the tool's shake feature, in which they needed to shake the tablet to complete an action; some children were not shaking the tablet hard enough, so the developer adjusted the tool's sensitivity to better recognize users' actions.

These takeaways highlight the importance of user testing with young children.

Include Features That Support Children Navigating Tools Independently.

While tablet apps may offer opportunities for children to complete learning or assessment activities on their own and in small groups with adults, navigating a tablet independently can often present challenges for children. When designing ed tech products, developers may consider features that minimize the need for adult support with setup and navigation. This allows adults to focus on engaging with children about the learning materials rather than being occupied with technical issues. For example, many ed tech products include authentication features such as a username and password, which young children typically need an adult to help with. As an alternative, developers may instead consider child-friendly sign-on features like QR codes or visual patterns that children can create and enter themselves.

Examples from the Measures Initiative

A few assessment developers observed that some children were intentionally signing out of their account and into another user's account when working on assessment activities, while others exited out of the activity to try to open other apps on the tablet. Some children attempted assessments multiple times for various reasons, such as accidentally exiting the app and needing to restart, or intentionally repeating an activity because they enjoyed it. As these behaviors disrupt a child's experience and undermine accuracy of assessment results, developers determined they needed to include features such as:

- disabling assessments that were already completed,
- requiring passwords or other authentication features, and
- locking activities so that children could not exit the app.

In addition to helping users stay on task, these features can reduce ongoing logistical burdens experienced by educators — such as frequently needing to help children get back into the app — allowing them to instead focus on supporting children in other ways.

Include the Ability to Pause and Save Progress Throughout.

Ensuring that ed tech products have autosave features and allow users to pause activities without losing data is important for a positive experience. Technical glitches that require restarting a device are an inherent risk, and in the pre-K classroom, other kinds of interruptions are expected due to young children's schedules and needs. Given the likelihood of interruption, it is helpful for ed tech products to allow children to return to their activities without having to start over from the beginning. Otherwise, the need to redo already completed tasks is likely to diminish engagement and generate frustration.

Examples from the Measures Initiative

One assessment tool in the Measures Initiative was initially designed to save progress after children finished a large, multistep activity. Pilot testing demonstrated that this approach to saving was not sufficient; some children accidentally exited the assessment while they were mid-activity and their work was not saved, which resulted in duplicate attempts to complete the activity and, in some cases, user frustration. In response, the assessment developer is exploring adding a save state after each question so that if children exit the app, they will return to the exact question where they left off.

Designing Enjoyable and Engaging Product Features

Though ed tech products for young children have an important purpose, they should be engaging and enjoyable to use.[9] Through pilot testing, assessment developers identified specific features that seemed to be particularly engaging for children as well as areas for improvement. The following strategies emerged as effective methods of making activities fun for children.

Include Opportunities for Children to Make Choices.

Providing children agency when using ed tech products can help them stay motivated and engaged in activities. Where possible, ed tech developers may consider incorporating opportunities for children to make decisions about their experience to help foster this agency. Even with a set curriculum or product, it is possible to embed choices for users, as the examples demonstrate.

Examples from the Measures Initiative

- One assessment tool that was effective in providing children agency allowed the user to design a character who accompanies the user through the assessment experience.
- Another tool similarly gave children the option to select from a range of existing characters to join them.
- Some tools allowed children to select which activities they wanted to complete or to choose which scenario to engage with first from a range of options—for example, exploring a fantasy island, building a sports team, spending time at a salon and barbershop, or celebrating a birthday at a grandparent's house.
- One assessment prototype provided additional books and forms of support that children could choose to engage with to practice using the tool.

Include Positive Feedback and Encouragement.

Including positive feedback features such as rewards, digital badges, points, or encouragement for completing activities can be motivating for some children and may make the product more exciting to use.

Though research on the effects of these features on intrinsic motivation is mixed, including opportunities for autonomy (such as allowing children to choose their prize) and focusing feedback on children's effort and persistence in learning, rather than outcomes, may help support their intrinsic motivation.[10]

Examples from the Measures Initiative

- One of the tools provided virtual prizes at the end of assessments that children could choose from, such as new clothing or accessories for the virtual guide that appears in the tool.
- Other tools presented users with digital stars or included verbal praise after activity completion. Educators often noted that children appreciated hearing positive feedback that praised their effort on the task, like "Good listening! Let's keep going!"

Include Fun, Whimsical, or Silly Designs and Features.

Young children are often engaged by bright pictures, silly noises, and fantastical imagery in ed tech products. Though including these features helps to provide an engaging experience for children, designers should be cautious not to make these features so captivating or overwhelming that they distract children from the main task.[11]

Examples from the Measures Initiative

- Children were excited about silly noises produced by the characters in one assessment tool; a small pig that "oinked" a funny song when selected was especially notable.
- Prototype testers of another tool enjoyed a feature in which they tapped monsters while making a pattern, causing the monsters to emit unique sounds.
- Varied backgrounds in tools also helped keep children interested in the activities they were completing. The subtle changes in design signaled a change in activity to maintain interest, but were not so interesting that children were distracted and unable to move on to the next activity in a timely manner.
- Educators also suggested that including movement, not just static imagery, in activity scenes would help keep children engaged.

Include a Storyline to Add Purpose and Interest.

Another way to encourage engagement in ed tech products is to embed the required activities in a storyline or motivating context. For example, establishing a scenario in which children help a character accomplish a task by completing different activities can provide motivation for children and make the activities more engaging and relevant.

Examples from the Measures Initiative

- In one assessment tool that effectively implemented a storyline-based approach, users were presented with the scenario of helping their aunt serve clients at her salon. Children completed a range of activities that captured information on their math, language, and literacy abilities in the context of salon-based tasks such as shampooing or braiding a character's hair. For example, users were asked to identify a letter on a shampoo bottle, and were given a task of adding three green beads to a character's braids.
- Another assessment developer received feedback from academic experts about how to make better use of a storyline-based approach. The initial iteration of the tool involved a patterning activity — a scenario in which children needed to build a bridge with beads in specific patterns. Academic experts who reviewed the tool recommended adding more context for why the children were building the bridge, prompting the developer to incorporate a more detailed storyline about building a bridge so that a friend could cross it.

Goal 2. Reflect Experiences and Perspectives That Are Familiar to Product Users

Ed tech products that provide connections to a child's home and community can help promote a sense of belonging and psychological safety, which in turn can help increase the child's engagement and motivation to learn.[12] Children are often more capable of displaying their knowledge of concepts in informal settings, and learn from family members who incorporate opportunities for learning at home and in everyday conversations.[13] For example, young children develop mathematical knowledge through daily experiences at home and in their communities, such as learning sorting skills by helping put away dishes.[14] Developing ed tech products that reflect these familiar situations, experiences, and contexts provides an opportunity to enhance the effectiveness of these tools.

Ensuring that an ed tech product effectively incorporates elements of children's daily lives and experiences requires careful consideration as well as engagement with the target audience. Developers of ed tech products can learn from the children, families, and educators who will be using their products to determine what they would like to see and to receive feedback on draft content; importantly, this process should take into account users from groups that have been historically overlooked in product development. Below are takeaways assessment developers identified as useful for developing ed tech products that reflect the experiences and perspectives of the intended audience.

Embed Activities in Contexts Familiar to the Children Who Will Be Using the Product.

One method of reflecting children's daily experiences and perspectives in ed tech products is to provide relevant context for activities. This strategy can involve adding visual backgrounds, storylines, and situations that are familiar to users. Details such as specific foods, animals, and toys can help establish a convincing and realistic context. Asking families, children, and educators what they would like to see is an effective way to incorporate more of these touches.

Examples from the Measures Initiative

- Some of the prototype assessment tools designed for the Measures Initiative included activities testing isolated skills, such as finding a shape or identifying a letter, in the absence of context. Families, educators, and academic experts recommended contextualizing these activities in real-life situations. In response, one assessment developer designed a shape identification task by embedding shapes in familiar environments and asking children to find them; for example, the developer embedded circles for children to find in a cityscape, as wheels on cars and lights on a stoplight.
- Another developer incorporated more opportunities to receive feedback into their design process. This developer chose to share scripts, mood boards, storylines, and sketches of characters and scenes on an ongoing basis with a group of caregivers, administrators, and educators to obtain feedback and reactions before incorporating them into the prototype. This process resulted in the incorporation of meaningful details in activity scenes that the developer had not originally thought to include.
  - One activity designed by this developer presented a scenario involving a Spanish-speaking family at the grandmother's home in South Florida. Rather than including a game of Scrabble on the grandmother's table, as the developer originally planned, families suggested that dominoes or Lotería could make the scenario more relatable to some children.
  - Reviewers also noted that the grandmother's home should have more plants and trees — specifically, a mango tree — to be more representative of the geographic location.
  - Children, families, and educators recognized and appreciated this developer's attention to detail when engaging with the tool.

Include Human Characters in Activities.

Children's media often features animals and other nonhuman characters. However, including human characters in ed tech products can often be an effective design choice, as human characters provide opportunities for representation of different traits and roles, increasing the likelihood that users can relate to the characters. In other words, seeing a character who looks like a friend, caregiver, or educator may help children connect with that character and provide a more authentic experience, which can help facilitate learning and promote user engagement with the product.[15]

When including human characters in a product, providing them with a range of characteristics and avoiding stereotypes or bias in representations is critical. One way to do this is to codesign with the children, families, and educators who will be using the product.

Examples from the Measures Initiative

- One assessment tool in the Measures Initiative originally included only animal characters. Following discussions with academic experts, the developer updated the assessment to also include human characters with a variety of traits and reflecting a range of roles in the community.
- Another tool included numerous human characters whom the developer codesigned with families and children, revising the characters' appearance based on feedback throughout the design process. The feedback resulted in changes to characters' facial features, hairstyles, clothing, and names.

Conclusion

As ed tech developers create new early learning products and expand on existing products, connecting with users for feedback can help ensure that the products are representative and engaging for children, that educators and families will use the products, and that the tools are easy to use and function as intended. The suggestions in this brief, based on assessment developers' experiences in the Measures Initiative, emerged from this kind of user feedback on technology-based assessment tools for children that incorporated interactive, playful experiences. As such, they are promising strategies for ed tech developers of a variety of products for young children to explore and test. ■

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