

## Co-designing Culturally Responsive Reading Assessments

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**Abstract:** As societies become more diverse, the population of adult learners is also growing increasingly heterogeneous. Adult education systems must adapt accordingly to ensure that lifelong learning opportunities remain accessible and relevant for all. However, the cultural diversity and lived experiences of adult learners are often underrepresented in existing assessments. The goal of this study is to implement culturally responsive assessment principles in the co-design of adult reading assessments. Nine adult educators co-developed nine fictional representations (avatars) that reflect the cultural backgrounds, ethnic identities, lived experiences, and learning goals of adult learners. Educators also adapted reading passages to align with these fictional avatars, and these were reviewed and revised to ensure that culturally responsive principles were incorporated. Reflections from one adult learner and two educators highlighted both enhanced engagement and challenges, as well as areas for improvement, throughout the study. The adapted reading passages demonstrated appropriate readability levels, and the assessment items reflected acceptable difficulty levels for the target population, as indicated by responses from fourteen adult learners. The study showed that the co-design process strengthened key culturally responsive assessment principles, including shared power, engagement, high expectations, and an asset-based approach in test development. Suggestions for future research are provided.

**Keywords:** Adult Education, Culturally Responsive Assessment, Co-Design, Reading, Fairness

### Introduction

The adult learner population is becoming increasingly diverse around the world (Borgonovi & Suárez-Álvarez, 2025; OECD, 2024). According to the 2023–2024 National Reporting System (NRS) report (see Table 1), adult education programs in the U.S. serve more females than males, with the majority of learners falling within the 25 to 44 age range. Most importantly, adult education serves diverse students in terms of

ethnicity and race, including Hispanic/Latino, Black/African American, White, Asian, American Indian/Alaska Native, Native Hawaiian/Other Pacific Islander, and individuals of two or more races (NRS for Adult Education, 2023-2024). In 2022-2023, 56% of adult learners enrolled in the English as a Second Language (ESL) program, and 42% of them were in employment (NRS, n.d.). By adapting assessment practices to better reflect learners' needs and real-world contexts, we can ensure that assessments reduce disparities, promote engagement in adult education, and enhance workforce readiness in the 21st century (Borgonovi & Suárez-Álvarez, 2025; Suárez-Álvarez et al., 2024).

**Table 1.** Sociodemographic of adult learners (NRS Adult Education Term: 07/01/2023 - 06/30/2024)

Characteristic		Total participants served
Sex	Female	738,856
	Male	549,511
Age	16-18	102,744
	19-24	224,700
25-44	25-44	666,438
	45-54	179,582
55-59	55-59	50,901
	60+	69,957
Ethnicity/Race	American Indian or Alaska Native	10,595
	Asian	98,680
Black or African American	Black or African American	269,023
	Hispanic or Latino	611,004
Native Hawaiian or other Pacific Islander	Native Hawaiian or other Pacific Islander	3,360
	White	261,273
More than Once Race		35,432
Total		1,288,367

Assessments in education provide essential information for learners, educators, researchers, governments, policy makers, and interested parties about learners' skill proficiency. They are typically designed and used for various purposes, including informing instruction and learning, monitoring systems, tracking progress, certifying skills, and ensuring accountability (Borgonovi & Suárez-Álvarez, 2025). In any case, assessments that do not incorporate diverse characteristics of learners may potentially lead to inaccurate results in portraying learners' skill proficiency (Randall, 2021; Sireci, 2020; Sireci & Randall, 2021).

For assessments to be responsive to learners' needs and relevant to real-world contexts, they must both mirror learners' lived experiences and serve as a window into perspectives and experiences different from their own (Phillips, 2022). Including diverse cultural representations in assessments promotes personal affirmation and fosters cross-cultural understanding among learners (Patterson, 2025). This is especially important given the diversity of the adult learner population, which is also reflected in today's workplace.

Culturally responsive assessment (CRA) principles advocate for incorporating cultural context in the assessment stimuli. It is a crucial step in developing inclusive and equitable standardized assessments (Montenegro & Jankowski, 2017) and avoiding direct or indirect favoritism of the predominant culture (Olivera-Agular et al., 2024). CRA seeks to connect students' funds of knowledge (e.g., cultural values, lived experiences) with the targeted skills assessed (Bennett, 2023; Coopens & Kelley, 2025; Montenegro & Jankowski, 2017; Sireci, 2020). Applying CRA enhances engagement and provides a fairer opportunity to demonstrate skill proficiency for diverse learners through integrating context-relevant information in the assessment stimuli (Walker et al., 2023). By representing the diverse characteristics of learners in assessment, CRA helps identify the existing potential that remains untapped by the traditional assessment (Blair et al., 2020; Randall, 2021).

To date, the implementation of CRA has elicited positive and negative feedback from learners across cultural groups. Randall (2025) found that CRA fostered a sense of relatedness to the assessment content among the racially and ethnically minoritized learners. It also promoted cultural learning and empathy by exposing learners to diverse viewpoints. However, Patterson (2025) reported that CRA-based items evoked emotional and personal responses, both productive (e.g., positive affect, cognitive familiarity) and counterproductive (e.g., discomfort, personal disconnection). These findings underscore the importance of an intentional approach to CRA item development, which involves understanding how context fosters a sense of relatedness and familiarity while also acknowledging potential emotional and cognitive barriers.

Despite the emergence of several frameworks and guidelines for CRA (e.g., Bennett, 2023; Randall, 2021, 2022, 2023; Solano-Flores, 2023; Sireci, 2020; Sireci et al., 2025), few adult education assessments have effectively adopted them. While some studies have applied co-design approaches to assessment development (Harvey et al., 2023; Honey et al., 2022; Zieschank et al., 2021), widespread integration of CRA principles in adult skills assessments is still lacking. The goal of co-designing assessments is to engage key stakeholders in collaboratively identifying and integrating students' funds of knowledge into assessment design. Co-design is, therefore, a student-centered approach that aims to enhance the representation of diverse students' funds of knowledge in assessment design (Trumbull & Nelson-Barber, 2019). Thus, helping maximize the positive impact of CRA while minimizing unintended negative consequences.

## **Best Practices of Co-Design Studies in Test Development**

Co-design studies require collaboration between stakeholders and rights-holders through a variety of research activities. Slattery (2020) defined co-design as meaningful end-user engagement in research designs, emphasizing the involvement of end-users throughout the research process. This involvement can vary in level, frequency, and intensity depending on the role of each participating party. Rooted in a community-based participatory research approach, the collaborative work between researchers and community representatives is committed to promoting social justice and leading to positive changes (Kral & Allen, 2016). This approach adheres to principles such as problem-solving orientation, movement toward action, engagement of participants as co-investigators, and collaborative data collection and analysis throughout the research process (Tisdell et al., 2025).

The co-design study demonstrates potential in advancing CRA development by engaging directly with the people for whom the assessment is designed (Sireci et al., 2025). Previous studies have demonstrated the implementation of co-design in assessment development (Goertzen, 2023; Honey et al., 2022; Smith, 2025),

particularly in developing culturally relevant or responsive assessments (Harvey et al., 2023; Shanmugam et al., 2025). Co-design in the assessment development process focuses on fostering shared understanding with teachers and further enhancing the sense of ownership among participating co-researchers (Goertzen et al., 2023). The collaborative efforts between researchers and co-researchers (key stakeholders and right-holders) reflect the implementation of the “shared power” provisional principles of CRA, which promote equity in assessment design (Walker et al., 2023). The five provisional principles of CRA are elaborated in a later section of this introduction.

The co-design study involves a broad range of activities throughout the assessment development process. Harvey et al. (2023) described a series of community meetings held to conceptualize the targeted constructs and the use of the early childhood assessment tool. The goal was to gather educators’ direct expertise and perspective on the applicability in the classroom context.

Shanmugam et al. (2025) demonstrated collaborative efforts with co-researchers in developing the assessment blueprint, incorporating the cultural context in the item adaptation, and reviewing the items during the assessment development phase. Collaboration with co-researchers, educators with backgrounds in education and experience teaching students from the targeted cultural group, enhanced engagement and deepened understanding of the cultural contexts and test content. The item adaptation process involved incorporating students’ lived experiences, simplifying linguistic structures and vocabulary, and modifying test scenarios (e.g., names, settings, and experiences). Finally, the process included a review of the adapted items based on the test content, followed by refinement of the assessment blueprint.

The co-design approach in assessment development is iterative and dynamic, involving multiple cycles of refinement to produce the final assessment. Activities are not limited to core design tasks, such as defining constructs, specifying blueprints, incorporating cultural context, and reviewing items, but also extend to user experience testing (Honey et al., 2022; Zieschank et al., 2021) and pilot testing (Harvey et al., 2023; Shanmugam et al., 2025). Each activity contributes critical feedback that informs the continuous improvement of the assessment.

## Current Practices of Culturally Responsive Assessment Development

In the assessment design process, Walker et al. (2023) introduced five provisional principles on CRA designs, i.e., shared power, high expectations, flexibility, engagement, and asset-based principles. These principles inform how students learn and express knowledge (*cognition*), how tasks are designed for students to assess that knowledge (*observation*), and how responses are interpreted (*interpretation*).

The *shared power* emphasizes equitable involvement of all stakeholders throughout the assessment process. *Engagement* refers to designing tasks that activate productive cognitive strategies and foster a sense of belonging. *High expectations* reflect the belief that students can perform at high levels by engaging students in a higher-order thinking process. *Flexibility* accommodates individual differences and the diverse needs of learners, particularly those who have been historically excluded from education and assessment. Finally, the *asset-based* principle challenges deficit-based narratives by valuing students’ linguistic, cultural, and social identities (Walker et al., 2023).

Rooted in the culturally responsive pedagogy (CRP) framework, Gay (2000) described CRP as a paradigm that values personal and cultural strengths, intellectual capabilities, and prior accomplishments of students from diverse ethnic groups. In alignment with this framework, CRA stimuli reflect the tenets of CRA and support students’ positive beliefs about their cultural heritages and academic potential (Gay, 2018). These stimuli serve as both “mirrors” and “windows”, offering views into experiences beyond their own.

Each stimulus is aligned with one or more CRA tenets. The *validating* tenet acknowledges students’ cultural knowledge, experiences, and references, establishing connections between home and school

experiences. The *comprehensive and inclusive* tenet emphasizes preserving students' ethnic identity and cultural identities throughout the assessment process. The *multidimensional* tenet promotes the integration of curriculum content, classroom lived experiences, and cultural backgrounds. The *empowering* tenet aims to promote students' competence and courage to succeed in the tasks. The *transformative* tenet encourages the challenge of traditional practices by addressing cultural dominance and promoting a more inclusive approach. The *emancipatory* tenet refers to efforts that remove barriers embedded in mainstream norms of learning. The *humanistic* tenet honors the dignity and respect of diverse individuals and groups, enabling students to acquire self-knowledge and a deeper understanding of others. Finally, the *normative and ethical* tenet seeks to correct cultural misconceptions and exclusions by revealing how educational systems are often shaped by Eurocentric culture (Gay, 2018).

The eight CRA tenets (Gay, 2018) inform the design of assessment stimuli and questions that address students' cultural identity and lived experiences. Within a test validation framework, contextualizing assessment stimuli to reflect students' cultural and lived experiences and developing scenarios relevant to their real-world contexts can strengthen the measurement arguments for CRA. Additionally, in a broader perspective, the CRA provisional principles (Walker et al., 2023) guide the reflection (self-audit) throughout the co-design process of developing culturally responsive reading assessments, including collaboration with stakeholders, writing and reviewing assessment stimuli and items, and gathering evidence on the usability of the assessments.

## Current Study

The goal of this study is to implement a co-design approach grounded in Culturally Responsive Assessment (CRA) principles to develop reading assessments aligned with the Teaching Skills That Matter (TSTM) Skillblox framework and the College and Career Readiness Standards (CCRS) for Adult Education (Pimentel, 2013). Our research question was "How can co-design be used to develop culturally responsive reading assessments for adult learners?" This research also aims to rethink traditional test development steps from a fairness and equity perspective by incorporating collaborative efforts with educators and students to ensure the representation of diverse cultures and students' lived experiences in reading assessments.

## Methods

### Participants

In this study, there are four primary actors. The first actor is the Adult Skills Assessment Program (ASAP), a research team within the Center for Educational Assessment at the University of Massachusetts Amherst (see <https://websites.umass.edu/asap/>). The ASAP team includes two distinct groups of assessment experts: the item writers and the internal review panel. Three international graduate research assistants with formal training in educational measurement and psychometrics served as item writers. Their role was to add and revise items aligned with the targeted CCRSAE ELA standards. Additionally, the internal review panel included three researchers each holding a doctoral degree in educational measurement and psychometrics—and three additional graduate research assistants with relevant training in the field. Both item writers and the internal review panel participated in a culturally responsive assessment item writing workshop provided by the Center for Measurement Justice on November 26, 2024, and January 27, 2025 (see <https://measurementjustice.org/>).

The second key participating actor is the TSTM SkillBlox team at World Education. The TSTM SkillBlox team comprises adult education and education technology experts responsible for providing open technology resources and guiding adult educators in developing instructional resources aligned with the

TSTM framework and CCRSAE through an online platform called SkillBlox (see <https://ies.ed.gov/use-work/awards/teaching-skills-matter-tstm-skillblox-research-team>).

Adult educators represent the third group of key participating actors. Adult educators were recruited through EdTech Maker Space workshops. ETMS is a national, project-based professional learning community that convenes in-service ABE/ASE and ESOL instructors, program leads, and instructional coaches to co-create instructional resources (TSTM-SkillBlox) (Vanek et al., 2023). Adult educators within ETMS workshops are professionals who are the intended users of the assessment and who routinely design classroom assessments. Between November and December 2024, forty-one (n=41) adult educators participated in the workshops led by the TSTM-SkillBlox team at World Education. Of those, nine adult educators (n=9) were directly involved in the co-design of culturally responsive reading assessments. Furthermore, two adult educators participated in the user experience interview (n=2).

Lastly, adult learners represent the fourth key participating actor. Fourteen adult learners participated in the quantitative usability study (n = 14), and one adult learner participated in the qualitative user interview study (n = 1). All of the participating adult learners were recruited through the adult educators involved in the *EdTech Maker Space*. The identification of learners and educators was anonymized.

## Materials

**Reading Passages.** Nine reading passages from the Southwest Adult Basic Education (<https://www.readingskills4today.com/>) were selected as the initial foundation for developing culturally responsive reading materials, considering the relevance of the reading passage's story to the adult workplace context. Each passage is aligned with a specific ELA standard from the CCRSAE framework. The correspondence of the reading passages and the corresponding ELA standards can be seen in Table S1, Supplementary Materials 1.

**EdTech Maker Space Training Materials.** Training materials (e.g., PowerPoint slides, assignments) were developed as part of the *EdTech Maker Space*. They covered topics such as culturally responsive assessment, creating avatars to represent diverse students, and adapting reading passages to reflect those avatars. The specific workshop sessions and goals are outlined in Table S2, Supplementary Materials 2.

The *EdTech Maker Space* combined direct presentations with facilitated small-group discussions to help participants understand CRA, create student avatars, and adapt reading passages. To support this process, the ASAP team provided guiding questions to scaffold avatar creation (see Table S3 in the Supplementary Materials 3). To further develop educators' skills in culturally responsive assessment, an independent study assignment was given after the session.

## Design

The study is structured in three phases: co-design, internal review, and external evaluation. In the co-design phase, adult educators participated in *EdTech Maker Space* training on December 9, 2024. In this session, they collaboratively adapted a reading passage for a given student avatar through group work activities. Following the training, participants were invited to complete a voluntary independent assignment to develop an initial version of their student avatars and further adapt the reading passage to reflect the avatars' identities, lived experiences, and funds of knowledge, using the resources outlined in the materials section. The independent study was documented and submitted via Google Drive. Upon submission, the ASAP team provided feedback, including expressions of appreciation, confirmation, and suggestions for improving the reading passage adaptations.

In the internal review phase, the item writers refined and developed reading passages and items. The reading passages were adapted using avatars developed in the co-design phase. Furthermore, the items were refined and developed to align with the targeted standards (i.e., RI/RL.2.1., RI.3.2., RI.3.3., RI.2.6.). Item

writers also improved the readability of the texts by analyzing passage length (word count) and Flesch-Kincaid Grade Level, comparing the adapted versions to the originals.

To extend the item review procedure, the internal review panel evaluated the clarity and readability of the items, the effectiveness of the response options, and the cultural responsiveness of the assessment stimuli. Item writers made adjustments based on feedback received from the internal review panel. They also evaluated the representation of culturally responsive assessment tenets (Gay, 2018) in the adapted reading passages and items. The internal review panel provided a qualitative review through the comment section on the online assessment platform. At the end of the study, item writers assessed the extent to which the co-design process in designing culturally responsive assessment reflected the provisional principles of CRA outlined by Walker et al. (2023).

In the external evaluation phase, a user experience study was conducted in collaboration with TSTM-SkillBlox to assess the usability of culturally responsive reading assessments. Learners and educators completed the assessments before participating in interviews, which explored their experiences and reactions to the assessment system. Following the usability testing, interview questions related to the ASAP assessment systems for educators and learners were delivered by the TSTM-SkillBlox research team. The goal of the external evaluation phase focused on the feasibility of the CRA adaptation workflow and the usability of the assessment rather than a validation of the psychometric properties of the CRA.

The educators' interview questions cover the educators' observation on the students' experiences taking the assessment (*"Please describe what it was like for your students to use the assessment. For example, was it easy or difficult to access it, follow the assessment instructions, answer the questions, and get the results?"*), the relevance between the assessment content and instructional material in SkillBlox (*"Was the assessment content relevant to the instructional material in SkillBlox? And to what you teach?"*), Additionally, the learners' interview questions cover the learners' experience in taking the assessment (*"Tell us about taking an ASAP assessment. Did you link from SkillBlox? What difficulties did you have?"*), the relevance between the assessment content and instructional material learned in SkillBlox (*"Do you think the assessment questions ask about what you had learned in SkillBlox?"*), cultural responsiveness of the assessment stimuli (*"Do you feel the assessment considered your cultural groups and their values? Do you see your daily experiences in the story used in the assessment?"*), and the relevance of the assessment results for learning (*"Do the assessment results give you helpful information about your reading skills?"*).

In parallel, initial item analysis was calculated to determine whether the revised items appropriately targeted participants' proficiency levels. Learners' responses, such as the answers and response time, were recorded using a digital platform. Figure 1 visualizes the co-design research procedure in this study.

## Data Analysis

First, item writers examined the extent to which the adapted reading passages aligned with the tenets of culturally responsive assessment. To address this question, we review the representation of CRA tenets in the eight adapted reading passages. The review was conducted by one item writer who was not directly involved in the adaptation of the reading passages used in the assessment modules. The review process involved collecting strategies used to adapt the reading passages. The eight CRA tenets proposed by Gay (2018) served as the primary framework to guide the evaluation and ensure their representation within the passages.

Item writers also observed the extent to which the co-design process was implemented in the development of culturally responsive reading assessments. To address this question, we conducted a self-evaluation on the entire co-design study process (co-design phase, item review, and external evaluation) through the provisional principles (e.g., shared power, engagement, high expectations, flexibility, and asset-based) of the CRA provisional principles (Walker et al., 2023). The self-evaluation process involved compiling documentation of research activities throughout the study. These documents were then mapped

onto the CRA provisional principles according to their theoretical definitions. The self-evaluation process was conducted by the ASAP research team.

Second, we explored how culturally responsive reading assessments performed during the initial usability test. We analyzed qualitative user interview transcripts from adult educators and adult learners, and quantitative data records from adult learners. To analyze the qualitative user interview transcript, we conducted a hybrid coding approach (Fereday & Muir-Cochrane, 2006), combining deductive (theory-driven) and inductive (data-driven) strategies. The qualitative analysis aims to explore the students' feelings and thoughts about the culturally responsive reading passages by identifying keywords and constructing themes based on similar keywords.

In parallel, we calculated the percentage of correct responses to ensure that the cultural adaptations did not make the items more difficult than intended for the target proficiency level (Taylor & Ferrara, 2025). Learners completed the assessment without time limits, and multiple attempts were allowed. For item analysis, only completed responses were included.

## Results

### Co-Design Phase: Adapting Reading Passages Using Learner Avatars

The first output of the co-design phase was the nine student avatars created by adult educators. The avatars represent diverse ethnic and racial identities of adult learners. Seven out of nine avatars represent immigrant students, such as Moroccan, Black, Latina, Eritrean, Liberian, Kurdish, Ukrainian, and Afghan students. Seven of the learners speak a language other than English at home and join adult education to improve their English skills. Detailed information about the nine student avatars was presented in Table S4, Supplementary Materials.

Figure 2 shows how the *Two-Weeks' Notice* reading passage was adapted based on Zahra's student avatar (for detailed information, see Table S4, Supplementary Materials 4, last row). The original reading passages are presented on the left, and the adapted reading passages on the right. The adaptation consisted of changing the character's name, adding situational context, adding the student's lived experiences, and incorporating the student's learning goals into the narrative.

The highlighted text on the right side of Figure 2 illustrates information about integrating the student's identity, lived experiences, and learning goals into the existing reading passage. The adapted passage presents an adult learner who is seeking a new job that offers better pay and flexible working hours, reflecting their learning goals. This adapted passage embeds the lived experiences of learners who balance employment with personal and educational development.

Originally, nine adult educators adapted nine existing reading passages. Of the nine culturally responsive reading passages adapted using student avatars, two passages created directly by adult educators were used for usability testing, while the item writers developed the remaining seven to cover all targeted academic standards. Of the seven passages developed by the item writer team, four passages were developed using avatars created by educators, and three passages were developed using avatars created by item writers. For example, the reading passage titled "Helping a New Coworker" was adapted to align with a student avatar created by the item writers team. Table 2 summarizes the strategies used to adapt culturally responsive reading passages. Furthermore, the adaptation process strategy in Table 2 was used to review the representation of the CRA tenet (Gay, 2018).

The readability of the adapted passages varied in both text length and Flesch-Kincaid Grade Level. Four adapted passages were shorter than the original versions, while the other four were longer. In terms of

**Figure 1.** Co-design study research design

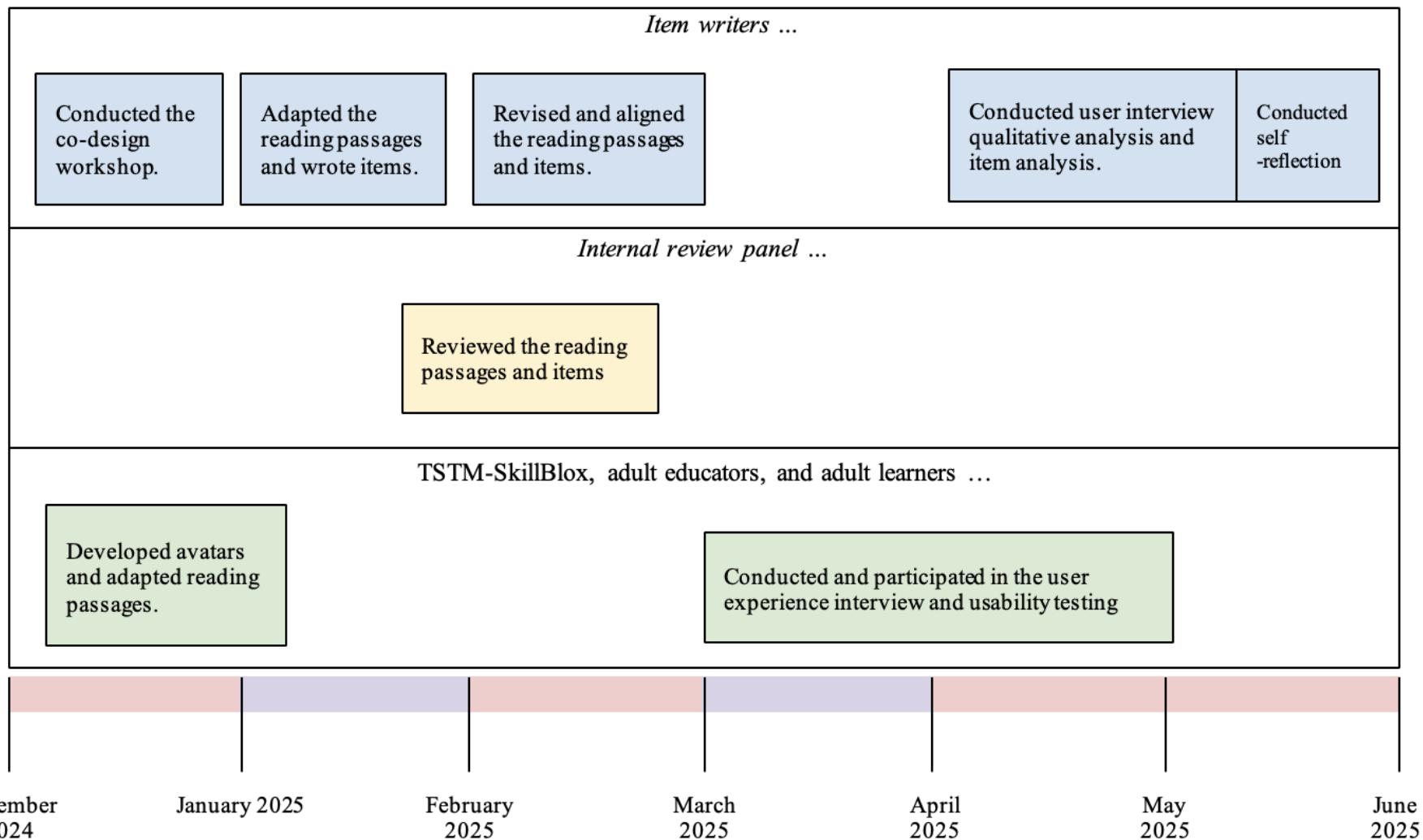
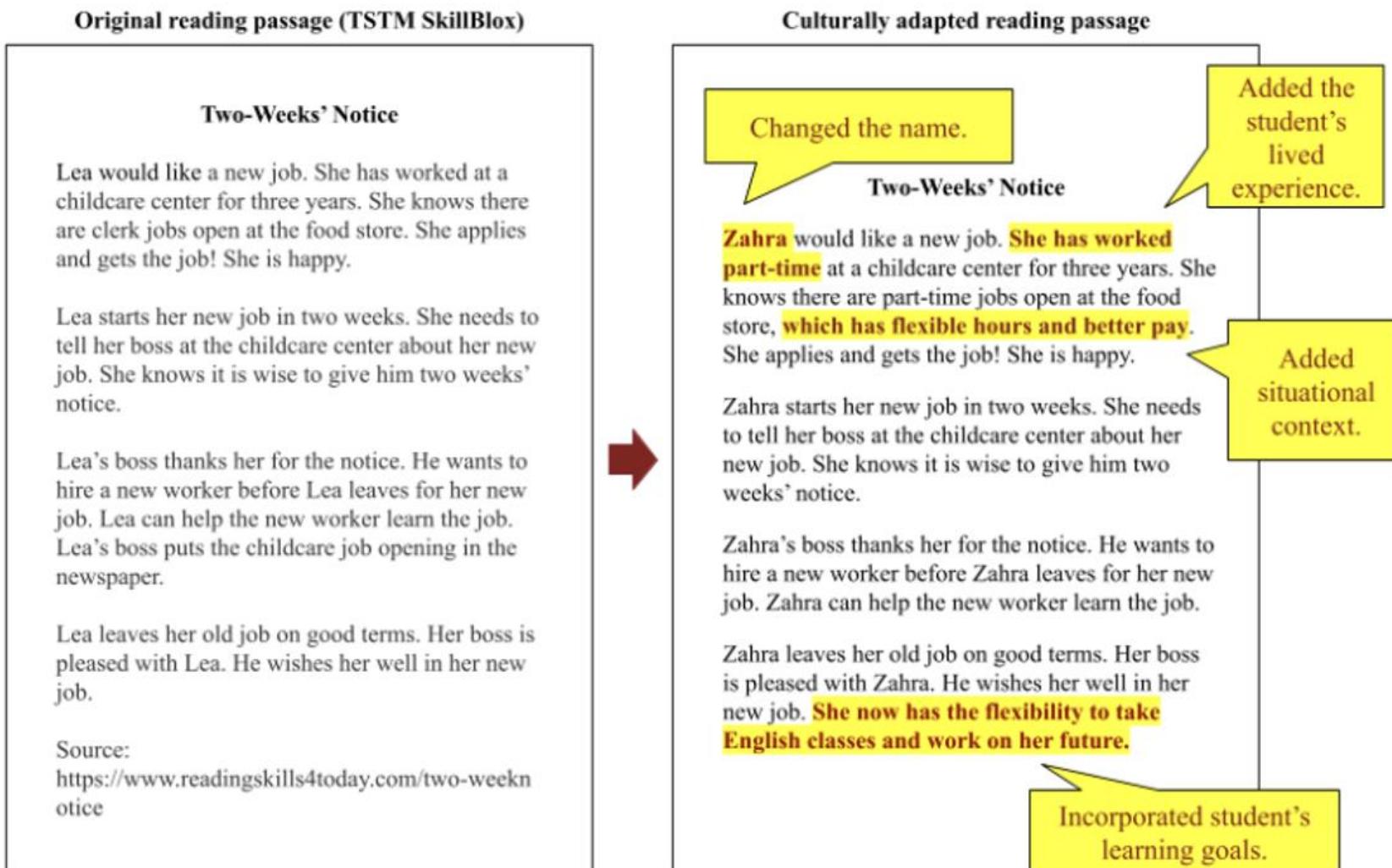


Figure 2. An example of a culturally responsive reading passage



readability level, all adapted passages showed higher Flesch-Kincaid Grade levels, indicating increased word and sentence length compared to the originals.

### **Internal Review Phase: Enhance Representation of Culturally Responsive Assessment Principles**

Following the co-design phase, item writers adapted the five existing reading passages with avatars developed by educators. Item writers included the avatar character's name and incorporated the avatar's lived experiences and learning goals. For example, Figure 3 presents a "Learn by Doing" reading passage adapted by educators that includes the Empowerment Act. The Empowerment Act means positive actions taken by the student or supportive responses from their environment. The main character in the reading passage is Maryam (see Table S4, Supplementary Materials, third row, for details about her student avatar). In the passage, Maryam has just started a new job at a restaurant, and another character, Samina, introduces her to the procedures for serving customers. The inclusion of the Empowerment Act in the reading passage reflected the representation of the "Empowerment" CRA tenets (Gay, 2018).

To create this adapted passage, adult educators reflected on how Maryam might feel in this situation, such as wanting to succeed and earn her supervisor's respect. Adult educators stated that "She (Maryam) wants to do well, and she wants her boss to like and respect her". In response to the student's feelings and thoughts, educators added a sentence at the end of the story to support the learner's emotional experiences, such as "Next time you will remember. Everyone learns from their mistakes." This addition illustrates the empowerment tenet by sustaining the possibility that learning can occur through mistakes. The other passages were adapted using a similar approach.

In each reading passage, item writers developed six items in total that assess three CCRAE ELA standards (i.e., RI/RL.2.1., RI.3.2., RI.3.3., RI.2.6.). Two questions were written to assess each ELA standard. The targeted standards in this study were associated with English Language Arts Level B (Grades 2-3).

Following this step, the internal review panel provided feedback regarding the readability of the reading passages and the questions by centering the attention on the characteristics of the learners, who are English learners. The reviews above indicate the unfamiliar words and complex structures when thinking about adult English learners. The suggestion from the reviewers was to rewrite the question or to replace the unfamiliar word with a word commonly used in English level B (Grade 2-3). The reviews also highlighted a potentially confusing statement written as an idiomatic expression that may influence the chance of answering the question correctly.

*"The wording of the question, 'Why was it bad that Alberta could not speak English' might be off-putting to EL's → Recommend switching to 'Why was it challenging for Alberta that she couldn't speak English?'" (Reviewer 4)*

*"Depending on language level, I would suggest replacing the word "colleagues" with "coworkers" or something similar in the reading passage." (Reviewer 2)*

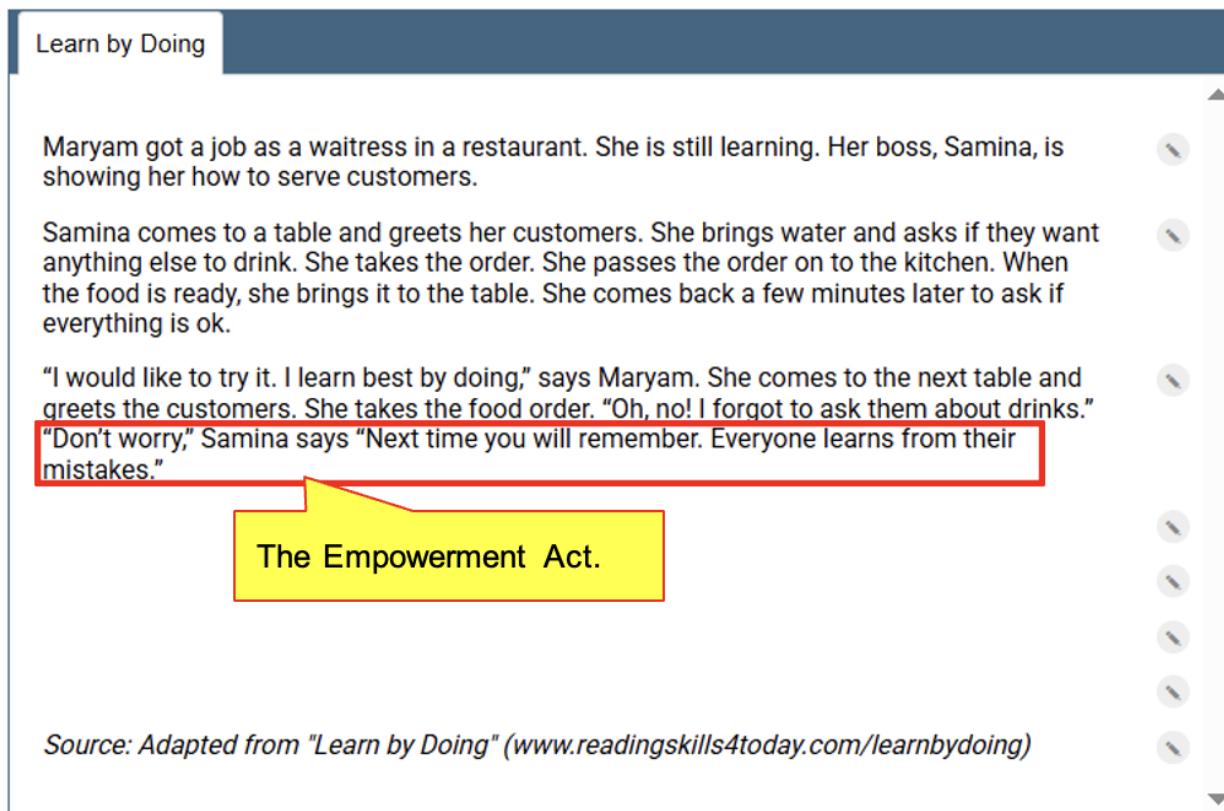
*"The wording of the options could potentially be confusing. For example, "feeling close" could be interpreted as either emotional closeness or physical proximity. However, physical closeness is also referred to in another response option ("She wants to snuggle with her daughter"), which makes it somewhat difficult to distinguish the correct answer. It would be helpful to clarify the context in which "feeling close" is used both in the passage and response option." (Reviewer 6)*

The internal review panel also indicated the representation of diverse students' lived experiences and ethnic identity in the story. Also, the reviews suggested potential improvement in subverting the narrative in the reading passage to make it more culturally responsive.

**Table 2.** Adaptation process to culturally responsive pedagogy tenets

Title of the reading passage	Adaptation process strategy	Who adapted the reading passage?		Text length (# words)		Flesch-Kincaid Grade Level	
		Educators	ASAP team	Original	Adapted	Original	Adapted
Two-Weeks' Notice	Adapt the character's name to an Afghan student's name, add student values, and add empowerment acts.	✓		146	131	1st Grade	3rd Grade
Job Interview Tips	Adapt the character's name to an Afghan student's name, and add student learning goals.		✓	165	129	2nd Grade	4th Grade
Education in My Life	Adapt the character's name to a Ukrainian student's name, and add student learning goals.		✓	153	174	3rd Grade	3rd Grade
Enjoying a Book	Adapt the characters' names to a Ukrainian name, and add student values.		✓	191	254	3rd Grade	3rd Grade
Learn by Doing	Adapt the character's name to an Afghan student's name, and add empowerment acts.	✓		132	135	1st Grade	3rd Grade
Helping a New Co-worker	Adapt the character's name to Latino student names, and add student values.		✓	153	112	1st Grade	4th Grade
Good Times are Bad on the Wallet	Adapt the character's name, and add initiative for problem-solving.		✓	183	227	2nd Grade	7th Grade
A Note to the Teacher	Adapt the character's name.		✓	171	168	Kindergarten	4th Grade

**Figure 3.** An example of an Empowering Reading Passage



**Learn by Doing**

Maryam got a job as a waitress in a restaurant. She is still learning. Her boss, Samina, is showing her how to serve customers.

Samina comes to a table and greets her customers. She brings water and asks if they want anything else to drink. She takes the order. She passes the order on to the kitchen. When the food is ready, she brings it to the table. She comes back a few minutes later to ask if everything is ok.

"I would like to try it. I learn best by doing," says Maryam. She comes to the next table and greets the customers. She takes the food order. "Oh, no! I forgot to ask them about drinks."

"Don't worry," Samina says "Next time you will remember. Everyone learns from their mistakes."

**The Empowerment Act.**

Source: Adapted from "Learn by Doing" ([www.readingskills4today.com/learnbydoing](http://www.readingskills4today.com/learnbydoing))

*"At face value, from a culturally responsive perspective, even though it is not a disruptive item, everyone can relate to it, and the Hispanic community is represented." (Reviewer 1)*

*"If the passage wants to subvert stereotypical narratives, this is a great moment to change Victoria into Victor and have Mateo's dad take on the role of remembering his dentist appointment." (Reviewer 2)*

*"There is another opportunity to subvert typical narratives by changing husband to wife." (Reviewer 2) "Specifically, the phrase 'She can help her husband pay' doesn't sit well with me. Either changing to wife, or changing the entire scenario of 'She needs to do something for him.' (Reviewer 6)*

Additionally, the internal review panel provided reviews regarding the grammatical rules of the sentence and the effectiveness of the distractors in the questions. Item writers revised the reading passages and the items based on the suggestions of the reviewers, but also balanced the adaptation process with the available students' characteristics in the avatar library.

Before the usability testing, these passages were qualitatively reviewed according to the CRA tenets (Gay, 2018). Four CRA tenets, i.e., comprehensive and inclusive, empowering, transformative, and emancipatory, were reflected in the current adapted culturally responsive reading passages. Table 3 summarizes the representation of CRA tenets in the culturally responsive reading passages.

The co-design study self-reflection highlighted that four principles were reflected in the co-design study process. Firstly, the collaboration with educators at the beginning of the process, i.e., workshops and reading passage adaptation, represents the intention to share power in the assessment development and to

**Table 3.** Representation of CRA tenets in culturally responsive reading passages

Reading passage title	Culturally responsive assessment tenet							
	VAL	CINC	MD	EMPW	TRFOR	EMCP	HUM	NORM
Two-Weeks' Notice	✓							
Job Interview Tips		✓						
Education in My Life		✓						
Enjoying a Book				✓				
Learn by Doing					✓			
Helping a New Co-worker						✓		
Good Times are Bad on the Wallet							✓	
A Note to the Teacher		✓						

Note: VAL=Validating; CINC=Comprehensive and Inclusive; MD=Multidimensional; EMPW=Empowering; TRFOR=Transformative; EMCP=Emancipatory; HUM=Humanistic; NORM=Normative and Ethical

incorporate students' funds of knowledge in the assessment stimuli. These activities represent shared power and asset-based principles in this current co-design study.

Secondly, the items in the assessment module were written in different types of item formats, such as multiple choice, true/false, and build-list based on the specific standards being assessed. Further, the item review that enhances the readability of the passages and items, as well as promotes the culturally responsive aspects of the assessment stimuli, represents the principles of high expectations and asset-based principles.

Lastly, the qualitative and quantitative data provided evidence on the enhanced engagement of adult learners, challenges, and areas for improvement of the culturally responsive reading assessments. Learners and educators described their experiences in taking the reading assessments and provided suggestions for improvement. Additionally, learners mentioned the familiarity of the assessment stimuli with their prior experiences, which allowed them to perform optimally. The various types of assessment items successfully assessed the targeted skill proficiency. These results highlighted the representation of shared power, high expectations, engagement, and asset-based provisional principles. Table 4 summarizes the representation of CRA provisional principles in the co-design study process.

#### **External Evaluation Phase: Assessing the Usability of Culturally Responsive Reading Assessments**

Three themes emerged from the qualitative analysis of educator interviews: technological barriers, learners' familiarity with reading assessments, and educators' reflections on the assessments themselves. The first theme is *technological barriers*, which represent the technological circumstances encountered by adult learners and educators when accessing and using the ASAP-SkillBlox reading assessment and the SkillBlox

**Table 4.** Representation of CRA Provisional Principles in the co-design study process

Co-design study steps	Culturally Responsive Assessment Provisional Principles					Activity
	Shared power	Engagement	High expectations	Flexibility	Asset-based	
Co-design	✓			✓		Developed student avatar, co-developed assessment task modules.
Internal review		✓		✓		Aligned reading passages to CR tenets, utilised several item formats.
External evaluation	✓		✓	✓		Conducted a user experience study.

platforms. Technological barriers seemed to be a critical issue, as they were encountered at the initial step of taking the assessments or learning materials. Learners accessed the assessment platform using various devices, including phones and laptops. Not all learners were experienced in using technology. Some younger learners were able to access the platform quickly, while others with limited access required more help from educators. Educators took some time to prepare learners to access the assessment platform.

*“Some students are on their phones, and some students are on their laptops, and some students are young, and from Latin America, and could figure things out very quickly. And other learners like their technology experience, is really limited. And on a phone, it’s really challenging. So, with all of that language. It took a couple of days to get onto SkillBlox for many of them. Some of them never got there.” .”* (P132, Adult Educator)

The challenges faced by adult learners also interacted with the problems within the ASAP system. Adult educators mentioned that the system loading did take time and sometimes did not work for all students.

*“I think the other challenge was when we tried the … assessments and going to go into that account for the ASAP-SkillBlox assessments. It’s they were having challenges with loading the … assessment for it to start the test itself.”* (P043, Adult Educator)

*“they tried to load the … assessment and wouldn’t load for them… It did for one person, but the other 3, it 3 or 4 of them. They did not.”* (P043, Adult Educator)

The second theme is the learner’s *familiarity with culturally responsive reading assessments*. This theme represents the feelings of connectedness that adult learners experience while taking the assessments. The learner explained their familiarity with the reading passage and the questions used in the culturally responsive reading assessment. Being familiar with the assessment formats enables learners to utilize their prior knowledge when taking the assessment. Although the assessment stimuli elicited a sense of format familiarity, the claims about cultural responsiveness across diverse student populations have not been explicitly stated.

*“[Question: Do you think that these questions were sensitive about your culture and values? When you were taking this, did you feel like it was respectful for your culture?]: “Yes, yes, it’s helpful. We did it in our language, in my country.” [Followup Question: Did you use the settings in the platform to make it in Dari (language)?]: “Not yet. We in my country learn like this stories and quiz. Yes.” (L013, Adult Learner)*

The adult learner also mentioned that the assessment story and questions do not elicit a feeling of discomfort. Instead, the adult learner mentioned a strategy for engaging with the assessment modules and responding to the questions carefully.

*“[Question: Did any questions make you feel uncomfortable?]: “Not yet. If we read the story carefully and understand the story, we will answer the questions quickly.” (L013, Adult Learner).*

The third theme is the *educators’ reflections on culturally responsive reading assessments*. This theme represents adult educators’ perceptions and usability of the assessments to support their teaching. The educators recognized the value and the barriers to implementing the assessment. One of the adult educators mentioned that the assessment questions are similar to the classroom assessment questions that were used by learners to enhance their comprehension skills.

*“[Question: Do you think they (assessment questions) were relevant and aligned with the instructional material that was in the SkillBlox?]: “Yeah, I mean, yes, it was, you know. It was very similar to the comprehension activity at the end of the SkillBlox. I mean, it wasn’t focus on just the big learning goal of finding the main idea. You know, it wasn’t quite. It was. It’s my memory. And now it’s a few weeks ago. So I is that it had like one or 2 questions about that, and then a lot. And then other kind of detailing questions. But yeah, it seemed to. It seemed to continue on with what they had been doing.” (P132, Adult Educator)*

As intended, each culturally responsive reading assessment module consists of six questions, with each pair of questions assessing an ELA standard. In total, there are three standards assessed within each assessment module. The test coverage on three different ELA standards was perceived as promoting continuing learning by educators. At the end of the assessment, learners received a test score report describing their proficiency in accordance with the associated ELA standards. The test report seems to be beneficial for learners. Learners were able to understand the meaning of the test report by looking at the total correct answers from an assessment module.

*“[Question: Were they able to understand what their result was?]: “They understood. I asked the how many questions they got correct, and some of them had, like 5 questions correct. Some of them had like 3 so, and we had one.” (P043, Adult Educator)*

Although the test report seems to be informative for learners, the limitations in providing results only for learners seem to be a crucial barrier to using an assessment that is relevant to educators’ teaching. Educators could not receive the test report results directly from the platform. They needed to ask each student to monitor their progress and provide feedback.

*“[Question: What did you do with the information about they were? How they did on the test.]: “I wrote it down on a piece of paper, and then I said, I said, ‘That’s good.’ I gave verbal feedback to them that they completed an assessment that is not in their language. But, it it’s difficult, maybe difficult to understand for them. But they did their best, I said. Try to do the assessment as best as you can.” (P043, Adult Educator)*

Educators perceived the feature for monitoring learners’ educational progress as a desirable feature in the assessments. Learning from the classroom assessment analogy used in SkillBlox, educators were

interested in knowing which questions learners answered correctly and incorrectly. This information helped improve the instructional content.

*“[Question: How might a tool like ASAP system and the online assessment items be more useful for your context?]: “You know … some of the explaining, which is the main idea, which is the you know details. I think some, I assess in that way, you know, because I can see their answers. You know I made them… So, it wasn’t just practice… I wanted to see how they were doing… I could see which questions they got right and which ones they didn’t get right. And that was helpful. And to see where they mess where they oops. You know.” [Followup Question: So, if the ASAP system had been set up to allow you to do that, do you think that might have been a more attractive assessment option for you?]: “For me. It would. Yeah.” (Adult Educators, P132)*

In terms of initial item difficulty, values for the *Two Weeks’ Notice* module ranged from 0.25 to 0.95, while those for the *Education in My Life* module ranged from 0.15 to 0.92. The build list items showed the lowest item difficulty index. These difficulty statistics represent the percentage of correct answers by learners for particular items.

The response time for the *Two-Weeks’ Notice* module ranged from 21.1 to 150.11 seconds, and for the *Education in My Life* module ranged from 20.5 to 147.52 seconds. Learners spent a longer time on the first question for both modules. This indicates the time needed to read the reading passage for the first time before continuing to the next question. On the other hand, learners also spent a longer time on the build-list question (147.52 to 150.11 seconds). The build-list question asks learners to order the responses in the correct sequence rather than choose one of the correct answers. The usability test item analysis results are summarized in Tables 5 and 6.

The score distributions for the *Two-Weeks’ Notice* and the *Education in My Life* modules ranged from one to six. No examinee’s attempt was scored zero, which indicates the floor effect was not observed in the usability testing. The score distributions for the two assessment modules were visualized in the Supplementary Materials, Figure S1.

**Table 5.** Preliminary item analysis results for Two-Weeks’ Notice

Item code	Item type	Standard	Percentage Correct	Response time (seconds)
Question 1	Multiple choice	RI/RL.2.1.	.57	144.55
Question 2	Multiple choice	RI.3.2.	.55	63.10
Question 3	True/false	RI/RL.2.1.	.90	21.12
Question 4	Multiple choice	RI.3.3.	.75	49.72
Question 5	Build list	RI.3.3.	.25	150.11
Question 6	Multiple choice	RI.3.2.	.95	40.39

Note: Number of attempts = 20.

**Table 6.** Preliminary item analysis results for Education in My Life

Item code	Item type	Standard	Percentage Correct	Response time (seconds)
Question 1	Multiple choice	RI.2.6	.92	108.45
Question 2	Multiple choice	RI/RL.2.1.	.85	27.04
Question 3	Multiple choice	RI/RL.2.1.	.85	26.64
Question 4	True/false	RI.3.3.	.69	30.61
Question 5	True/false	RI.2.6	.92	20.46
Question 6	Build list	RI.3.3.	.15	147.52

Note: Number of attempts = 13.

## Discussion

As societies become more diverse, the population of adult learners is also growing increasingly heterogeneous. Adult education systems must adapt accordingly to ensure that lifelong learning opportunities remain accessible and relevant for all (Borgonovi & Suárez-Álvarez, 2025; OECD, 2024). This study aimed to provide an alternative practice to traditional test development by implementing a co-design approach grounded in culturally responsive assessment (CRA) principles to develop reading assessments aligned with the Teaching Skills That Matter (TSTM) SkillBlox framework and the College and Career Readiness Standards (CCRS) for Adult Education (Pimentel, 2013). In the co-design process, test developers collaborated with community representatives, educators, and learners to co-develop a culturally responsive reading assessment for diverse populations of adult learners. The collaborative activities were embedded in the test design, test review, and test evaluation phases of the ASAP assessment.

The first key finding of this study was that adult educators effectively developed nine fictional representations (avatars), representing learners' characteristics, identity, and funds of knowledge. The avatars represented diverse personal characteristics of learners, in terms of their gender identity, ethnic background, and motivation in joining adult basic education. In this study, we observed that seven out of nine avatars represented female students who use 'She/her' pronouns. These results align with previous studies on the demographic characteristics of adult learners in postsecondary education, which indicate that adult learners are more likely to be female (56%) than male (Koller, 2025; NRS, n.d.).

However, seven out of nine avatars are immigrant learners from Moroccan, Black, Latina, Eritrean, Liberian, Kurdish, Ukrainian, and Afghan identities. These avatars overrepresent the adult learner population enrolled in ESL programs, but underrepresent historically minoritized learners in the U.S., such as American Indian/Alaska Native, Native Hawaiian/Other Pacific Islander, and also other races, such as White and Asian.

Our second key finding is that adult educators and test developers can effectively use fictional avatars to adapt publicly available reading passages in ways that make them more culturally responsive. The process began by incorporating students' identity, lived experiences, and funds of knowledge into the reading passage. The adaptation process consisted of modifying the character's name, adding situational context, incorporating lived experiences and learning goals, and sustaining the empowerment act. These findings support tailoring CRA assessments for specific groups of learners by adapting scenarios to their familiar

contexts and everyday experiences, thereby enhancing relevance for target learners (Shanmugam et al., 2025). Further, the use of adapted scenarios has the potential to inform the development of adaptive assessment designs that account for the sociocultural characteristics of test-takers (Sireci et al., 2024).

This study highlighted that the adaptation process often led to an increase in the text length of the reading passage. Although longer reading passages tend to show more complex readability indices, we observed that six out of eight adapted reading passages showed a higher readability index than the original reading passage; this means the reading passage is more complex than the original passage. However, the usability test of the assessment stimuli (reading passages and items) indicated that the reading passages were readable for learners.

The third key finding is the absence of floor effects in the item analysis, which supports the usability of the assessment stimuli. In other words, the items were not too difficult for the adult learners. Most participants were able to engage with the test items at an appropriate level. This suggests that the reading assessments were usable and accessible for the target population. The findings also indicated that learners spent 108 (*Two-Weeks' Notice*) to 145 (*Education in My Life*) seconds to answer the first question in the assessment system. The *Two-Weeks' Notice* contains 131 words, and the *Education in My Life* contains 174 words, and both of these passages' readability indices are equal to a third-grade level. The time learners took to complete the first question may also indicate the time to read the culturally responsive passages.

The usability of the assessment stimuli was also supported by the qualitative user interview results. Learners described their familiarity with the assessment formats, such as the story and questions used in the culturally responsive assessments. The assessment format aligned with the learners' prior experiences. Furthermore, we also found that learners mentioned a strategy for engaging with the assessment module. This finding indicates the feeling of relatedness with the assessment content that represents the engagement principles of CRA (Walker et al., 2023).

The intended outcome of the reading passage adaptation is the inclusion of culturally responsive tenets in the assessment stimuli. Our internal audit on the adapted culturally responsive reading passages found that four culturally responsive tenets, i.e., comprehensive and inclusive, empowering, transformative, and emancipatory, were implemented. However, our qualitative user interview results did not explicitly support this claim. Learners provided information about their familiarity with the assessment formats, but did not explicitly mention the relatedness to the culture embedded in the reading passage.

This study also aimed to investigate the performance of the items in the culturally responsive reading assessment modules. In the test design phase, we implemented three item formats, such as true/false, multiple-choice, and build-list questions, to assess CCRSAE ELA standards using the culturally responsive reading passage. According to the CRA provisional principle, the implementation of multiple item formats represents the high expectations principle of CRA, which emphasizes the expectations for all students to engage in higher-order thinking (Walker, et al., 2023).

Our fourth key finding showed that the items showed various percentages of correct answers, ranging from .150 to .950. A higher percentage of correct answers indicates an easy item, and a lower percentage of correct answers indicates a difficult item. Four items in the *Two-Weeks' Notice* module and two items in the *Education in My Life* module showed an acceptable item difficulty index, i.e., .20-.80. We also highlighted that the build-list item format tends to have a lower item difficulty index in comparison to true/false and multiple-choice item formats. Not only lower in difficulty, but the build-list items also require a longer response to complete. These results potentially indicate that the build-list items are more difficult than other item types. Applegate (2014) found that item formats that asked examinees to put information in the correct order tend to be more difficult and time-consuming than multiple-choice items in general. The

implementation of different item formats may need further investigation regarding the item type effects in assessment development.

Rather than simply indicating whether an item was easy or difficult, a low percentage provides information about the content area or skills that have not yet been mastered by the learners, and a high percentage provides information about the content area or skills that have been mastered. This interpretation highlights the area where additional support or instruction may be needed by learners (Taylor & Ferrara, 2025).

Aligned with the idea of using assessment to provide information about student needs for support and enhance instruction practice, the fifth key finding of this study found that educators expressed the need for monitoring learners' skill proficiency after taking the assessments. This finding clearly describes the shifting paradigm from assessment of learning to assessment for learning. Steele et al. (2024) found similar results where educators emphasized the importance of providing timely, task-specific, and dialogic feedback in culturally responsive assessment practices. However, our current culturally responsive reading assessments have not satisfied this condition. In this study, we found that educators took the initiative to ask learners' test reports to provide feedback because the feature for monitoring learners' achievement was not provided. It is obvious that the role of feedback is essential in learning.

Lastly, the current culturally responsive reading assessments were developed in a technologically-enhanced environment that allows learners to take the assessment on different types of devices. The sixth key finding of this study found that some learners accessed the assessment platform through mobile phones and computers. However, learners' experiences in accessing assessments with digital devices varied. Some learners found it difficult to access the platform. Echoing this condition, the ASAP assessment platform encountered problems while learners were trying to load the assessment. These are crucial issues at the beginning of test administration. Lenhart et al. (2025) explained that malfunctions in the test administration potentially triggered examinees to quit the assessment platform. Preventing errors at the beginning of test administration seemed to be a critical goal for further development.

### **Limitations and Further Study Considerations**

The first limitation of the study was that the current set of avatars disproportionately represents immigrant learners. Amidst the diversity of adult learners and the small number of avatars developed by educators at this point, future work should include underrepresented groups of learners, such as historically minoritized populations in the U.S. The goal was to better reflect the demographics of the adult learner population.

The second limitation was that the co-design process only involved participation from adult educators. In this study, we showcased the participation of adult educators in developing avatars of the learners. Although this approach helped enhance the representation of diverse learners by relying on educators who had worked with hundreds of students from varied backgrounds, it is equally important to involve adult learners themselves in developing the avatars to ensure they reflect their lived experiences (Shanmugam et al., 2025; Smith et al., 2025). Further study should actively involve adult learners themselves to ensure that their values, traditions, and worldviews are authentically represented in the assessment (Shanmugam et al., 2025).

The third limitation was that this co-design study heavily relied on internal audit by the researchers' institution. The internal audit aimed to evaluate the implementation of the co-design study through the lens of the CRA framework and to evaluate the adapted reading assessment stimuli through the lens of the CRA tenets. Although the self-evaluation addressed the representation of the CRA framework and CRA tenets in the research output, this approach is sensitive to the subjectivity of the researchers. Ideally, evaluation by external parties provides more objective evaluations of the process. In the absence of external parties,

conducting a reflexivity process potentially captures the impact on the researchers' subjectivity during the co-design study, including research design, data analysis, and conclusion writing (Olmos-Vega et al., 2023; Jamieson et al., 2022).

The fourth limitation was that the ASAP-SkillBlox culturally reading assessment has not yet undergone a formal validation process. This includes providing additional evidence that the use of avatars enhanced test engagement and, where possible, improved performance, particularly among historically minoritized populations and individuals who are less likely to be represented in current assessment systems. Further studies could compare the adult learners' performance and engagement between the original and culturally-adapted assessment modules using the counterbalanced or crossover experimental designs with sufficient sample size for IRT-based linking/equating and or DIF analyses to evaluate changes in difficulty and fairness (Sinhary & Johnson, 2023). We caution the use of the ASAP-SkillBlox's culturally reading assessments for diagnostic and formative purposes until reliability, validity, and fairness evidence are provided (AERA et al., 2014).

### Implications for Practice

First, using avatars effectively portrayed adult learners' characteristics and integrated these traits into assessment stimuli, helping items serve as both mirrors (reflecting learners' identities) and windows (exposing them to new contexts). Second, collaboration with community representatives and adult educators strengthened the link between the usability and relevance of the assessment modules and classroom instruction. Overall, the findings suggest that adult-skills assessments can meaningfully align with adult learners' realities and instructional practices.

## Conclusions

This study demonstrated how culturally responsive assessment principles can be implemented through co-design procedures, evaluated their initial usability by adult educators, learners, education community representatives, and test developers, and identified key barriers to implementation. The current study provides practical guidance to assessment stakeholders and right-holders to establish shared power, engagement, high expectations, and asset-based CRA principles in the assessment design. Implementing co-design procedures with educators, education community representatives, learners, and test developers in reading assessments can help enhance the representation of learners' characteristics and the relevance of the assessments in real-world contexts. Thus, ensuring that lifelong learning opportunities remain accessible and relevant for all.

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## Supplementary Materials

**Table S1.** Original reading passages and their alignment with College and Career Readiness Standards for Adult Education

Reading passage	Associated CCRSAE standards	Source (Link)
Two-Weeks' Notice	R.I.3.2. Determine the main idea of a text; recount the key details and explain how they support the main idea.	<a href="https://www.readingskills4today.com/two-weeknotice">https://www.readingskills4today.com/two-weeknotice</a>
Job Interview Tips	RI.3.3. Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.	<a href="https://www.readingskills4today.com/jobinterviewtips">https://www.readingskills4today.com/jobinterviewtips</a>
Education in My Life	RI/RL.2.1. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.	<a href="https://www.readingskills4today.com/educationinmylife">https://www.readingskills4today.com/educationinmylife</a>
Enjoying a Book	RI.2.6. Identify the main purpose of a text, including what the author to answer, explain, or describe.	<a href="https://www.readingskills4today.com/enjoyingabook">https://www.readingskills4today.com/enjoyingabook</a>
Learn by Doing	RI/RL.2.1. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.  RI.3.3. Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.	<a href="https://www.readingskills4today.com/learnbydoing">https://www.readingskills4today.com/learnbydoing</a>
Helping a New Co-Worker	R.I.3.2. Determine the main idea of a text; recount the key details and explain how they support the main idea.	<a href="https://www.readingskills4today.com/helpinganewworker">https://www.readingskills4today.com/helpinganewworker</a>
Good Times are Bad on the Wallet	RI.2.6. Identify the main purpose of a text, including what the author to answer, explain, or describe.	<a href="https://www.readingskills4today.com/goodtimesbadonwallet">https://www.readingskills4today.com/goodtimesbadonwallet</a>
A Note to the Teacher	RI/RL.2.1. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.	<a href="https://www.readingskills4today.com/anotetotheteacher">https://www.readingskills4today.com/anotetotheteacher</a>

**Table S2.** EdTech Maker Space (ETMS) workshop for culturally responsive assessment

Content	Goal	Activity
Introduction to culturally responsive assessment.	To provide a common understanding of culturally responsive assessment using a metaphor of a <i>mirror and a window</i> .	Direct presentation
Student's avatar creation.	To provide an example of developing a student's avatar that captures the lived experiences, motivations, and challenges of the student.	Direct presentation
Development of a culturally responsive reading passage.	To provide an example of adapting a student's avatar information into an existing reading passage and make the reading passage empowering for the student.	Direct presentation
Development of reading questions/items.	To provide an example of various types of item formats (e.g., multiple choice, true/false, build list/ordering information, hotspot, etc.).	Direct presentation
Hands-on practice: Adapting a student's avatar into a reading passage.	To provide a hands-on practice on the adaptation of a student's avatar (Ximena, a Latina student) into an existing reading passage.	Facilitated small-group discussion
Homework: Creating my student avatar and my culturally responsive reading assessment.	To provide a hands-on experience of developing a student avatar and a culturally responsive reading assessment based on the experience in the classroom.	Independent study
Homework feedback: Providing constructive comments and suggestions for improvement.	To provide feedback for adult educators' homework on student avatars and CRA items development. Feedback consists of confirmation, appreciation, and suggestions for further improvement.	Independent study

**Table S3.** Student avatar and culturally responsive assessment guiding questions

Aspect	Question
<b>Development of the student's avatar</b>	
Student's identity (Culture/ethnicity, languages, political affiliation, spirituality/religion, neurodiversity, sexual orientation, gender identification, etc.).	<ol style="list-style-type: none"><li>1. <i>Who is the student I have in mind?</i></li><li>2. <i>What does the student look like?</i></li><li>3. <i>How do they identify themselves?</i></li></ol>
Student's characteristics (Previous education, current jobs/occupations, supported in learning, barriers to learning)/	<ol style="list-style-type: none"><li>1. <i>What is the previous education?</i></li><li>2. <i>What are the current jobs/occupations?</i></li><li>3. <i>What supports or barriers does the student have in learning?</i></li></ol>
Student's funds of knowledge and experiences (Short-term goals, long-term goals, how the student feels about the assessment, etc.).	<ol style="list-style-type: none"><li>1. <i>What are the reasons for engaging in the class?</i></li><li>2. <i>What are the future plans?</i></li><li>3. <i>What does the student value in life?</i></li><li>4. <i>How does the student feel about taking the assessment?</i></li></ol>
<b>Developing culturally responsive reading stimuli and questions</b>	
Student's feelings and thoughts about taking the assessment.	<ol style="list-style-type: none"><li>1. <i>How do they feel and think going into the problem illustrated in the original reading passage?</i></li><li>2. <i>What empowerment actions/efforts do I want to sustain in the story?</i></li></ol>
Evaluate the adapted aspect of the reading passage	<ol style="list-style-type: none"><li>1. <i>Does the new passage reflect my students' values and lived experiences?</i></li><li>2. <i>How long is the passage right now?</i></li><li>3. <i>Does the passage contain idioms or ambiguous terminology?</i></li><li>4. <i>Is the passage grammatically correct?</i></li><li>5. <i>Does the passage represent the same CCRSAE standards?</i></li></ol>

**Table S4.** Nine students' avatars by nine adult educators

Avatar's name (pronouns)	Student's identity	Student's characteristics	Student's funds of knowledge	Student's feelings & thoughts about the story	Empowerment needs
Karima (she/her)	Karima is Moroccan and lives with her husband, 2 children, mother, and mother-in-law.	Karima has a 9th-grade education from Morocco. She has a stronger math and science background. She is currently enrolled in English High School Equivalency classes. She is a stay-at-home mom with a special needs child. Karima tries to speak English with her children and husband at home. She notes her children communicate with grandparents only in Arabic. Karima is a multilingual learner, and her biggest challenges are reading and writing in English in a timed setting. Also, her son's health.	Karima wants to be able to support her daughter in school and communicate with her teachers. She also wants to communicate with her son's doctors more effectively and without a translator.	Karima is worried about leaving her daughter home alone after school, but also feels her daughter is ready.	Communicating and setting up rules together will help.
Rosa (she/her)	Rosa is a Latina student. She lives with her husband and two children.	Rosa has a high school diploma from Mexico. She is a stay-at-home mom. Rosa's husband and children speak English. They only	Rosa wants to communicate with her children's teachers and help her children with homework. She also wants to speak English	Rosa is worried that his blood pressure is too high.	I hope the employee makes Rosa feel comfortable, not to worry, and teaches him how to use the blood pressure machine.

Avatar's name (pronouns)	Student's identity	Student's characteristics	Student's funds of knowledge	Student's feelings & thoughts about the story	Empowerment needs
		speak Spanish at home because they want their children to be bilingual.	with people in her community.		
Maryam (she/her)	Maryam is 35 years old and just recently moved to the US with her husband and her 3 children.	<p>Maryam has a Master's degree. She worked as a teacher in Afghanistan.</p> <p>Currently, Maryam does not work. She needs to speak better English to get a job. She is very motivated but with 3 children at home and navigating life in a new country (house, shopping, kids' school, etc.) has limited time to study.</p>	<p>Maryam wants to get a driver's licence and earn her citizenship. She is planning to improve her technology skills, go to university and obtain good employment.</p> <p>Maryam values family, education and relationships.</p> <p>Maryam likes challenges and is ready to take necessary assessments to show what she needs to work on.</p> <p>Maryam wants to do well on assessments. Her husband who speaks English better often tries to help her/ give her answers.</p>	<p>Maryam is focused on understanding and remembering the instructions. She wants to do well and she wants her boss to like and respect her.</p> <p>Maryam wants to have a good relationship with her. She wants to try completing the task in front of her boss to show her motivation and her skills. She also wants to have some scaffolding the first time she performs the task - she wants her boss to watch her in case she needs more help or guidance.</p>	<p>Maryam is brilliant but in the past her husband spoke for her in many situations. I want Maryam to advocate for herself.</p> <p>I also want Maryam's boss to be encouraging and give her praise for her growth mindset.</p>
Farah (they/them)	Farah (they/them) is 28 years old, originally from	Farah attended formal schooling for several years but had to leave	Farah wants to find a better job and eventually support a younger family	Farah is a dedicated worker and wants to do a good job. They	Farah knows they learn best by doing and they can advocate for

Avatar's name (pronouns)	Student's identity	Student's characteristics	Student's funds of knowledge	Student's feelings & thoughts about the story	Empowerment needs
	Eritrea, and speaks several languages including Arabic and English. They identify as gender non-conforming and come from a culture in which their gender identity is not recognized.	due to family/social pressures related to their gender identity. They have an entry-level cleaning position in a hospital. They have no family support in their adopted country and show low self-confidence in learning, but they have a small group of friends who know and understand their identity and support them to continue learning. They are aware that they learn best by doing and sometimes struggle to learn by reading or watching. They are slowly developing more confidence to advocate for what they need in their learning and work life.	member to join them in their new country.	want to get a better job eventually and they know they need a good reference. They are eager to learn new skills but also feel some anxiety and self-confidence issues.	themselves and what they need.  The boss supports Farah and congratulates them on advocating for themselves and learning new things in the best way for them.
Samuel (he/him)	Samuel (he/him) is in his late 20s. He is originally from Liberia.	Samuel likes his job in a supermarket, but he will need to work evenings for now to be able to go to class during the day.	Samuel needs to improve his reading score on the placement test in order to get into the barbering program. He will make	Samuel wants to study to be a barber. To do this, he will need to work at night and go to class during the day.	Samuel is in control of the situation. He considers his own needs and those of his employer.

Avatar's name (pronouns)	Student's identity	Student's characteristics	Student's funds of knowledge	Student's feelings & thoughts about the story	Empowerment needs
	He wants to train to become a barber. He wants to own his own business.		faster progress if he goes to a class rather than study on his own.		
Akeira (she/her)	Akeira is a Black learner and speaks Jamaican Patois at home and in public. She lives with her family and is a Christian, cisgender woman.	Akeira began her education in her home country but did not finish high school. Her current job is as a home health aide. The barriers she has to learning include limited time to practice skills outside of class.	Akeira is coming to the class to improve her reading, writing, and digital literacy skills.	Akeira feels empathetic toward a new co-worker.	The importance of offering and receiving help at work.
Zainab (She/her)	This student, Zainab, emigrated from Kurdistan to the U.S. two years ago. She is a married mother of two	Zainab completed the U.S. equivalent of a secondary education in Kurdistan. She worked as a bank teller before she had kids, and now	Zainab wants to improve her conversational English and build her reading and writing skills. She desires to earn her high school equivalency	Zainab's husband makes most of the major decisions about money, so she is unfamiliar with making these types of	Success with money is far more about behavior than knowledge. Zainab is used to living frugally. Her spending decisions

Avatar's name (pronouns)	Student's identity	Student's characteristics	Student's funds of knowledge	Student's feelings & thoughts about the story	Empowerment needs
	<p>children who are ages 8 and 4. Zainab is a devout Muslim. She left Kurdistan to have more freedom in the U.S. She is thrilled that her family secured a visa to come to the U.S!</p>	<p>takes care of the kids and her household. Her English reading is around the 7th GLE, but she struggles with conversational English and is easily embarrassed when she makes mistakes speaking. She wants to complete a U.S.-recognized high school equivalency so she can get a good job once her kids are both old enough to be in school. Her husband wants her to work and is supportive of her school as long as it doesn't interfere with the running of the household.</p>	<p>so she can get a good job to help support her family. Zainab loves her family and her native land. She wants to know more about her new, adopted land. She is very determined and wants to meet the challenge of this assessment.</p>	<p>financial decisions. She does realize how expensive it is to live in the U.S. compared to her homeland. Zainab shops for the family and knows how hard it is to save money.</p>	<p>determine whether the family gets through the month well or has to borrow money to get by. I want Zainab to realize that her actions and behavior help determine her family's financial present and future.</p>
Anastasiya (she/her)	<p>Anastasiya is from Donetsk Oblast, Ukraine, and has three children. She is a single mother.</p>	<p>Anastasiya has a bachelor's degree in engineering. She is an industrial steel production engineer.</p> <p>In the home, the family speaks Ukrainian due to the fact that two of the</p>	<p>Anastasiya would like to communicate with her children's teachers and other students in her English class. Anastasiya wants to communicate in English with upper management and other</p>	<p>Anastasiya felt that there are a lot of regulations in a workplace environment, including for being safe and healthy.</p>	<p>Actions I want to sustain in the story are ways to continue to be safe and healthy while at work.</p>

Avatar's name (pronouns)	Student's identity	Student's characteristics	Student's funds of knowledge	Student's feelings & thoughts about the story	Empowerment needs
		<p>children are young, however, the oldest child supports Anastasiya in helping her with the English language.</p>	<p>stakeholders due to the company restructuring.</p> <p>Anastasiya believes in leadership, adaptability, and respect in the workplace. She wants to develop a career in the company, but finds ways to develop those skills in order to improve.</p> <p>Anastasiya also believes in having a balanced work-home life.</p> <p>Anastasiya has test anxiety, but uses strategies (breathing) in order to take the assessment.</p>		
Zahra (she/her)	Zahra is an Afghan student. She lives with her husband and two children.	Zahra has a high school diploma from Afghanistan. She works part-time. Zahra's husband and children speak English. Zahra speaks a little English. They only speak Dari at home because they want their children to be bilingual.	Zahra wants to get a better job with better pay and benefits to help with the family expenses. She also wants to go take classes to improve her English. Zahra also wants to communicate with her children's teachers and help her children with homework.	Zahra wants to take the new job to earn more money	Zahra is taking steps to improve herself and solidify her family's future in this country



**Figure S1.** Score distributions for the *Two-Weeks' Notice* and *Education in My Life* Assessment Modules

