Research Report

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RESEARCH REPORT

Examining How English Learners Interact With *WINSIGHT*® Summative Assessment Items: An Exploratory Study

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In this study we investigated how English learners (ELs) interacted with *WINSIGHT*® summative English language arts (ELA) and mathematics items, the embedded online tools, and accessibility features. We focused on how EL students navigated the assessment items; how they selected or constructed their responses; how they interacted with the assessment content; the problems they encountered while completing the items; and the perceptions they had of the items, online tools, and accessibility features. We conducted one-on-one cognitive interviews with 44 students, including 29 ELs and 15 non-EL students and found that EL students were able to complete the items on their own. Our findings suggest that the Winsight ELA and mathematics items are appropriate for ELs and allow them to demonstrate their knowledge and skills.

Keywords *WINSIGHT*® summative assessments; English learners; accommodations; pop-up glossaries; language toggle function

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The *WINSIGHT*® assessment program, which is designed to provide actionable information to inform teaching and learning, has a summative assessment component that is designed primarily to measure students' English language arts (ELA) and mathematics proficiency (Wylie, 2017). The Winsight assessment program also includes interim assessment (e.g., benchmark and testlet) and formative assessment components for students in Grades 3–8 and high school and was developed to improve teaching and learning in the United States (Wylie, 2017; Wylie & Millett, 2018). All the components in the Winsight assessment program have been designed to be fair and allow for valid inferences for all students, including English learners (ELs).

The 4.9 million ELs in K–12 public schools in the United States represent approximately 10% of the total student population (Institute of Education Sciences [IES] & National Center for Education Statistics [NCES], 2019). EL students are heterogeneous in their makeup, including their home language. Although ELs in the United States speak many different languages, Spanish is the primary language for most EL students in public schools. As of 2016, Spanish was the home language of 3.8 million EL students, representing 77% of all ELs and 8% of all public K–12 students. Arabic, Chinese, and Vietnamese were the next most common home languages (spoken by approximately 129,000, 104,000, and 78,000 students, respectively; IES & NCES, 2019). EL students are also diverse in terms of their country of origin and how and when they acquired their home language and English (Barrueco et al., 2012; Genesee et al., 1995). EL students may also have diverse formal schooling experiences, with some students having had interrupted or limited formal educational opportunities (DeCapua & Marshall, 2011).

The 2015 reauthorization of the Elementary and Secondary Education Act (ESEA), the Every Student Succeeds Act (ESSA), aims to ensure equal access to high-quality education for all students. Among other things, ESSA outlines federal policy in assessment and accountability and provides guidance on how to incorporate EL students into the state accountability systems. Thus, it is critical to ensure that academic content assessments (ELA, mathematics, science) are accessible to all students, including ELs, and yield accurate and reliable information on students' knowledge and skills in an academic content area regardless of their English language proficiency. One way to make academic content assessments accessible to EL students is by mitigating linguistic complexity in the test (Abedi, 2007). This could be accomplished by providing accommodations that support EL students' access to the test content and provide a fair and valid opportunity for them to demonstrate what they know and can do in an academic content area (Martiniello, 2009; Roohr & Sireci, 2017; Wolf et al., 2012).

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Assessment Supports for English Learners

Several studies have found that the performance on content assessments is greatly influenced by language skills (Abedi, 2002; Davies, 1991; Martiniello, 2009; Solano-Flores, 2014). Excessive linguistic complexity can impact EL students' abilities to understand mathematical word problems, and it may be a source of construct-irrelevant variance or measurement error in the assessment of ELs (Abedi, 2006; Martiniello, 2009). The effects of the linguistic complexity in content assessments could be lessened by reducing the unnecessary linguistic complexity of the items to ensure that the language demands do not interfere with students' abilities to demonstrate what they know in mathematics, regardless of their English language proficiency (Abedi et al., 2000). A few studies have identified which linguistic features tend to increase the complexity of academic content assessments, including word length, word frequency, prepositional and conditional phrases, sentence length, and passive voice (Abedi et al., 2001; Martiniello, 2009). However, linguistic modification has not been found to be an effective accommodation for all ELs (Abedi et al., 2000).

Another way to lessen the unnecessary linguistic complexity of content assessments is to provide accommodations that help ELs with their linguistic needs (Abedi, 2007). The goal of accommodations in content assessments is to make the assessment accessible to all students (Abedi, 2014) in order to increase the validity of the interpretations of what ELs know and can do in a specific academic area (Abedi et al., 2004; Abedi & Ewers, 2013; Roohr & Sireci, 2017). The most effective accommodations in making the assessment linguistically accessible to ELs are language-based accommodations such as using dictionaries, pop-up glossaries, read-alouds, and native language versions of the assessment (Abedi, 2007). Accommodations are most effective when they meet the specific needs of the students (Koran & Kopriva, 2017). For example, a meta-analysis of the effects of test accommodations for ELs concluded that ELs with a low level of English proficiency benefited much more from test accommodations than ELs with a high level of English proficiency (Li & Suen, 2012).

Several dual language supports have been documented to be effective in reducing the score gap between ELs and non-ELs that is attributed to the ELs' limited proficiency in English (Francis et al., 2006). Dual language supports include translation, bilingual test forms that allow students to toggle between two languages, bilingual glossaries, item read-alouds, and responding in their home language. Although test translation is commonly used as an accommodation to support ELs, it is possible that not all EL students may benefit from this type of support because their language and literacy proficiencies in English and their home language vary tremendously (Smarter Balanced Assessment Consortium [Smarter Balanced], 2012; Solano-Flores, 2008). Lopez et al. (2017) recommended providing dual language supports that are always available to students, but which students are not required to use. Currently, two multistate consortia in the United States, Smarter Balanced and The Partnership for Assessment of Readiness for College and Careers (PARCC), provide accessibility and accommodation resources to support ELs. For example, Smarter Balanced offers full-text translations (currently in Spanish only) and pop-up glossaries, both in English and the students' home language (Smarter Balanced, 2014). These supports are presented through its online assessment platform and are always available to the students.

The Winsight summative assessments have been developed with the same considerations of accessibility and fairness that were characteristic of the original Winsight program (Wylie, 2017; Wylie & Millett, 2018). In terms of accessibility and accommodation features, a set of specific linguistic accommodations were developed for EL students (e.g., English pop-up glossaries; a Spanish mathematics assessment that allows Spanish-speaking ELs to toggle between English and Spanish). However, more empirical evidence on how these accessibility and accommodation features support ELs is needed.

Purpose of the Study and Research Questions

The Winsight summative assessments are intended to be fair and valid for all students, including ELs. The accessibility and accommodation features in the Winsight summative assessments should support all ELs in demonstrating what they know, understand, and can do regardless of their English language proficiency. The Winsight summative assessment component requires evidence to support its claims about intended uses and interpretations in accordance with the *Standards for Educational and Psychological Testing* (American Educational Research Association et al., 2014). Thus, it is important to provide evidence to show to what extent EL students at different English language proficiency levels can access the assessments and demonstrate their knowledge, skills, and abilities. The findings from this study are seen as contributing to the validity evidence needed to support the claim that the Winsight summative ELA and mathematics assessments allow EL students to demonstrate what they know and can do fairly and equitably.

At this juncture, it is essential to investigate empirically how EL students interact with Winsight ELA and mathematics items and the embedded online tools and accessibility features. The goal of the study is to examine how EL students engaged with a sample of online ELA and mathematics Winsight summative assessment items. We focused on how EL students navigated the assessment items; how they selected or constructed their responses; how they interacted with the assessment content; the issues or challenges they encountered while completing the items; and the perceptions they had of the items, the online tools, and the accessibility features. We used this information to respond to the following research questions:

1. Did EL students encounter issues or challenges interacting with the online Winsight ELA and mathematics items that might introduce construct irrelevant variance into their test scores?
2. Did EL students use the available online tools and accessibility features in the Winsight ELA and mathematics items, and were those tools and features perceived as helpful?
3. Did the students use the language toggle function for the Winsight mathematics items, and was that function perceived as helpful?

Methods

Winsight Items

We used some of the items that are publicly available in the Winsight item sampler.[1] The item sampler is a preview of the Winsight test format and question types and provides students with an opportunity to become familiar with the test format, the question types, and the online tools they will experience when they take a Winsight assessment.

ELA Test Forms

We developed three ELA test forms for this study: Grades 3 – 5, Grades 6 – 8, and high school. Each of these tests had three sections (reading, writing mechanics, and listening). The reading section required students to read a literary text and then answer questions. The writing mechanics section required students to read a piece of student writing that contained errors and then identify and correct some of them. The listening section asked students to listen to a passage and then answer questions about it. The students can listen to the passage only once (see Figure 1). Each test form had 10 items and included both selected response and constructed response items. The extended response item included in each form had a built-in text editor menu to help students undo, redo, cut, copy, and paste text (see Figure 2).

Table 1 provides information about the item types that were included in each of the three ELA test forms. The goal was to allow students to experience different item types.

The summative ELA Winsight tests included six online test tools: zoom, bookmark, note, highlighter, line reader, and answer eliminator.

- Zoom: Students can decrease and increase the size of what it is shown on the screen.
- Bookmark: Students can mark any questions they want to return to at any time.
- Note: Students can leave notes for themselves to refer to later.
- Highlighter: Students can color different parts of the test (e.g., text, figures, prompt, options).
- Line reader: Students can use this tool to focus on specific parts at a time (e.g., a line, a paragraph).
- Answer eliminator: Students can mark answers they think are incorrect.

The Winsight summative ELA assessment allowed certain words or phrases in a reading passage to be tagged and glossed with a brief definition that appears as a pop-up. These definitions were accessible to all test takers (both ELs and non-ELs). There were two words/phrases glossed in the Grades 3 – 5 test (raring to go, cannonballs), four items in the Grades 6 – 8 test (thiamine, deficiency, voracious, hand-cast), and one in the high school test (a bit of chaff in a tempest).

The ELA test forms included different types of directions for the students. General directions at the beginning of the test provided information about how to move between items, how to check their progress, how to use the split screen function, and how to use all the online tools. The students could also access these general directions at any time during the test. Additional directions at the beginning of each section informed the students about what they needed to do to complete the items.

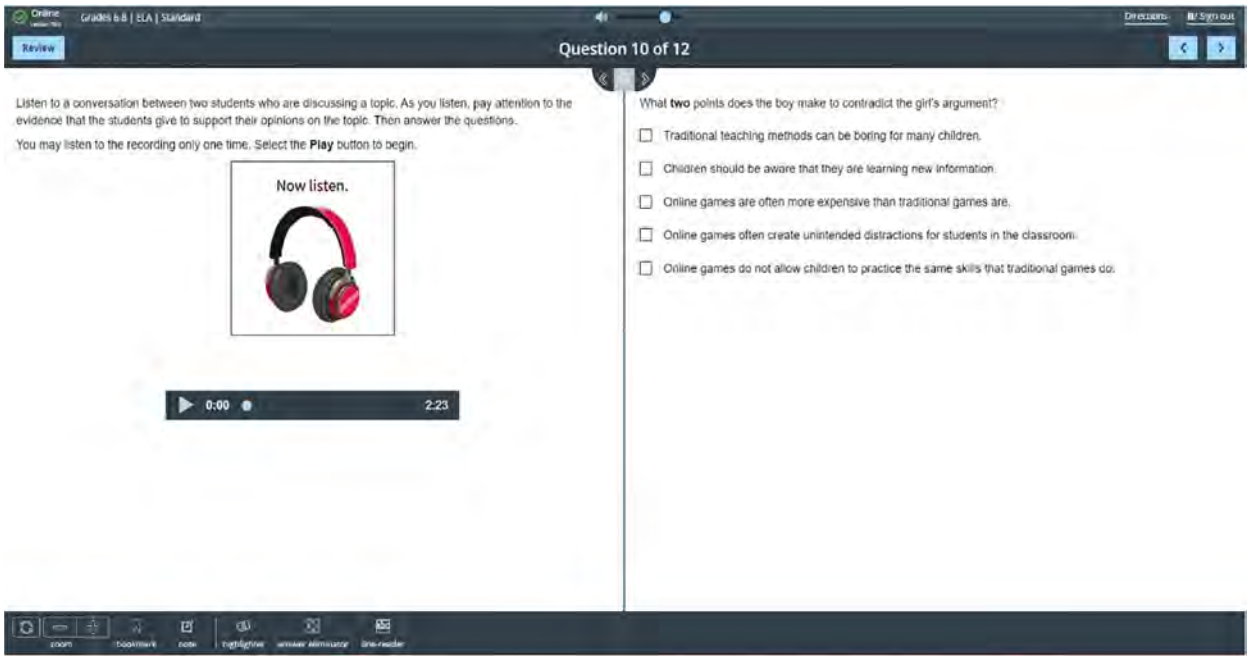

Figure 1 Sample directions in a *WINSIGHT*® ELA listening item.

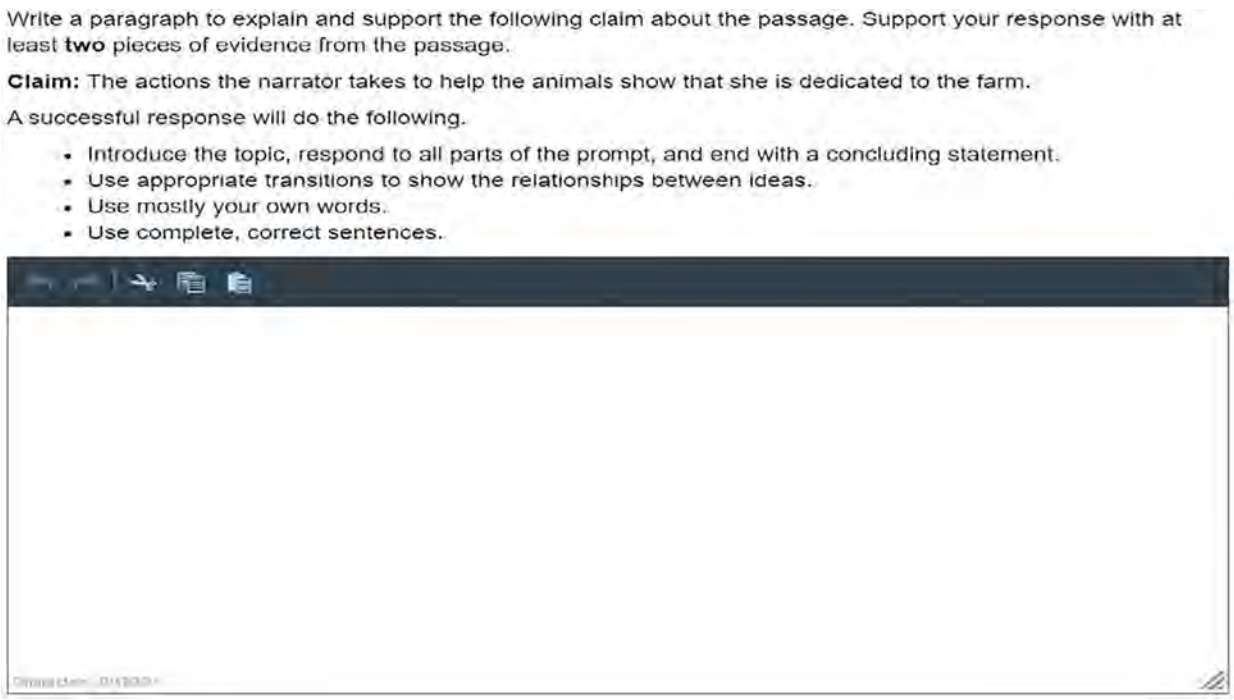

Figure 2 Text editor for extended response items in *WINSIGHT*® ELA forms.

Mathematics Test Forms

We also developed three mathematics test forms for this study: Grades 3–5, Grades 6–8, and high school. Each mathematics test form included 13 items. The first six items required students to read and answer the questions in English, and the last seven items allowed students to read and answer the questions in either English or Spanish (items with language toggle function) as we wanted to see how the students interacted with the English only items and the bilingual items.

Table 1 Number of English Language Arts Items by Type and Grade Level

Item type	Grades 3 – 5	Grades 6 – 8	High school
Multiple choice, single selection	3	5	5
Multiple choice, multiple selections	1	1	1
Inline choice list (drop down lists)	2	1	1
Grid (complete table)	1	—	—
Zone (select predefined areas)	1	—	—
Match (drag and drop)	1	1	1
Text entry (write short response)	—	1	1
Write extended response	1	1	1
Total	10	10	10

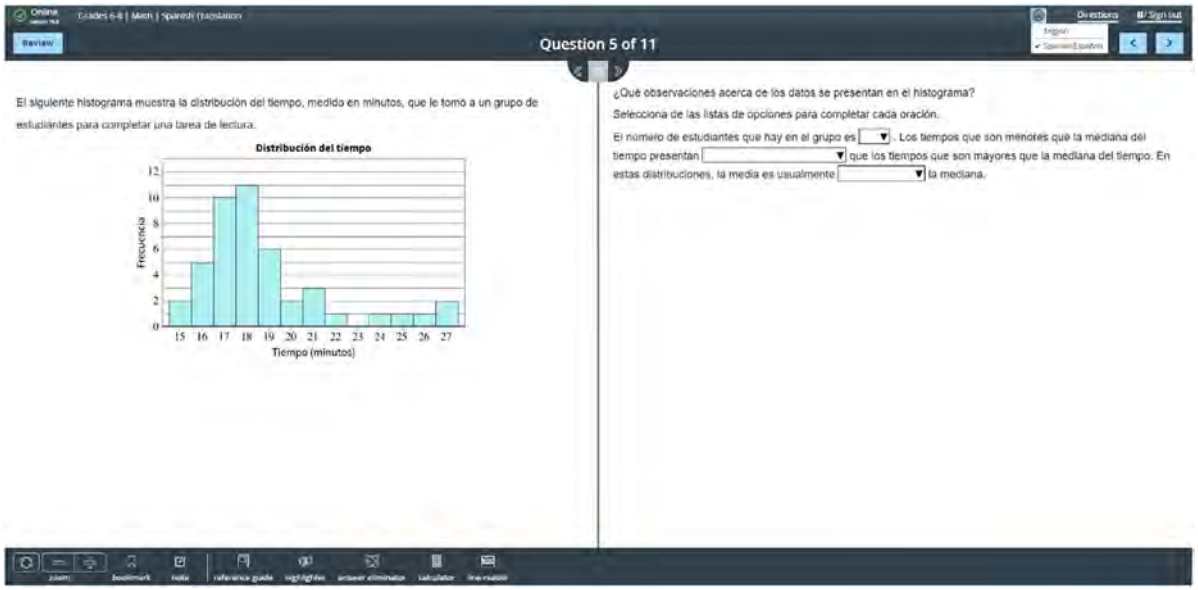

Figure 3 Language toggle function from *WINSIGHT*® mathematics forms.

In order to toggle between English and Spanish, students must click on an icon on the upper right corner as shown in Figure 3. Students could toggle back and forth between the English and Spanish version at any time.

As in the ELA test forms, we included different items types in the mathematics test forms (see Table 2). Each mathematics test form included an extended response item that required students to use an equation editor (see Figure 4).

The summative Winsight mathematics test forms included the same online tools as the ELA test forms. However, the mathematics test forms were also equipped with four online math-related tools that are integral to the mathematics assessment: ruler, protractor, calculator, and reference guide. The ruler and protractor were only available in the Grades 3 – 5 test form, although none of the items in the item sampler required students to use these two tools. The calculator was available in all the test forms, but only for items that did not assess the students' computational skills. The reference guide was also available in all the tests and provided a few formulas and conversion tables. The reference guide was the same for all the items within the test form.

The Winsight mathematics assessment also allowed certain words or phrases in the question to be tagged and glossed with a brief definition. However, only two items in the item sampler (Grades 6 – 8 test form) had glossed words. For this reason, we decided not to focus on the use of glossaries in the mathematics test forms in this study.

Participants

The initial target for the cognitive interviews was a convenience sample totaling 60 students: 20 students (15 ELs at different English language proficiency levels and five non-ELs) for each grade level span (Grades 3 – 5, Grades 6 – 8, and high school).

Table 2 Number of Mathematics Items by Type and Grade Level

Item type	Grades 3–5	Grades 6–8	High school
Multiple choice, single selection	1	1	1
Multiple choice, multiple selections	3	1	1
Grid (complete table)	1	1	1
Match (drag and drop)	1	1	1
Inline choice list (drop down lists)	2	2	2
Zone (select predefined areas)	1	1	1
Graph (use graph tool)	1	1	2
Number entry (enter a number in a box)	1	3	2
Write fraction (numerator and denominator)	1	1	1
Extended response with equation editor	1	1	1
Total	13	13	13

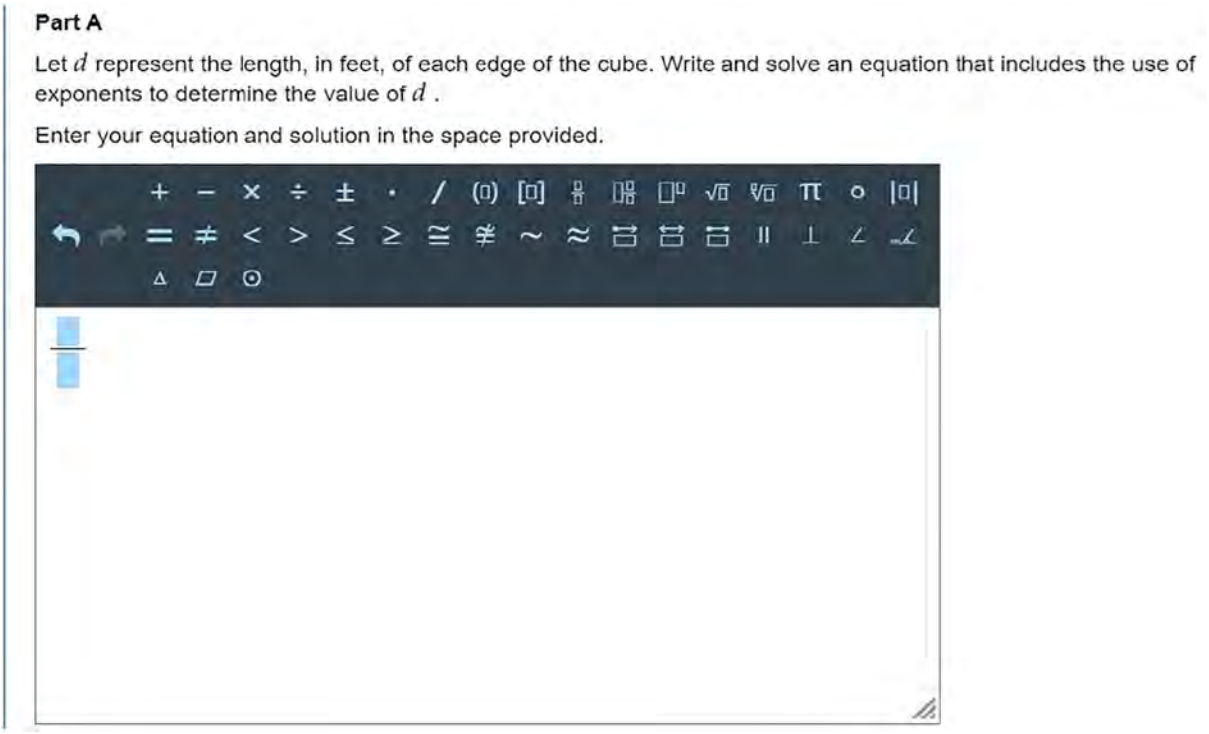

Figure 4 Equation editor in the extended response items in the *WINSIGHT*® mathematic forms.

A convenience sample is a specific type of nonprobability sampling method that relies on data collection from population members who are conveniently available to participate in study. In this study, only students who responded to our call for participation and whose parents gave consent for participation were included. In total, 44 students were recruited for this study. Of the 44 students, 29 were ELs (13 in Grades 3–5, eight in Grades 6–8, and eight in high school) and 15 were non-ELs (five in each grade level span). All the non-ELs were recruited to come to Educational Testing Service (ETS) after regular school hours. The EL students were recruited in different locations in New Jersey. We recruited nine EL students at a community center in Union County, 12 students at a community center in Middlesex County, seven students at an afterschool program in a high school in Union County, and one student who came to ETS after regular school hours. In this study, all the participants completed two test forms: first a mathematics form and then an ELA form. See Table 3 for more detailed information about the participants for this study.

Table 4 provides information about the EL students' self-ratings of their English and Spanish language proficiency in listening, reading, speaking, and writing. All the Spanish-speaking students reported that they were proficient in listening and speaking in Spanish, although some of them were not very proficient in reading and writing in Spanish.

Table 3 Description of Students by English Learner (EL) Status

EL status	Grades 3–5	Grades 6–8	High school
EL high	7	4	2
EL intermediate	5	3	3
EL low	1	1	3
Non-EL	5	5	5
Total	18	13	13

Table 4 English Learners' English and Spanish Language Proficiency Self-Ratings

			English				Spanish			
Form	*N*	Rating	L	R	S	W	L	R	S	W
Grades 3–5	13	Not very good	1	2	1	2	0	6	0	5
		Average	2	4	4	2	6	4	9	5
		Very good	10	7	8	9	7	3	4	3
Grades 6–8	8	Not very good	0	0	1	0	1	1	0	3
		Average	5	3	1	3	4	5	5	4
		Very good	3	5	6	5	3	2	3	1
High school	8	Not very good	2	1	2	2	0	0	0	0
		Average	3	4	3	4	1	3	1	3
		Very good	3	3	3	2	7	5	7	5

Note. L = listening; R = reading; S = speaking; W = writing.

Most EL students in this this study indicated that they had had mathematics instruction in English. Only five students (one student who completed the Grades 3–5 forms and four who completed the high school forms) reported that they had never had mathematics instruction in English. These students are currently enrolled in a bilingual program where mathematics instruction is in Spanish. Likewise, of the 29 EL students, 11 (three students who completed the Grades 3–5 forms, six who completed the Grades 6–8 forms, and two who completed the high school forms) reported that they had never had mathematics instruction in Spanish.

In terms of the language used to assess their mathematics skills, 23 EL students indicated that they had already taken mathematics assessments in English. The other six EL students (one student who completed the Grades 3–5 forms and five who completed the high school forms) indicated that this was the first time taking a mathematics assessment in English. Conversely, a few of the students (three students who completed the Grades 3–5 forms, three who completed the Grades 6–8 forms, and six who completed the high school forms) had previously taken a mathematics assessment in Spanish. The other 17 students indicated that they had never taken a mathematics assessment in Spanish.

We also collected information about students' experiences using computers both in school and at home. Most of the participants indicated that they use computers in schools frequently, although not all the EL students had access to a computer at home. All the students who participated in this study had already taken an online assessment, including an online mathematics assessment. Table 5 provides additional information about participants' computer use in school and at home.

Data Collection Procedures

We conducted one-on-one cognitive interviews with students. During the cognitive interview, students completed the items using Chromebooks. The researchers observed the students' actions and responses as they worked through the online assessment forms and then asked them questions about their experiences completing the items. The cognitive interviews were conducted in English, Spanish, or both languages, depending on the student's preferences. Each student completed two cognitive interview sessions. In the first one, the students completed the mathematics form, and in the second one, they completed the ELA form. Each cognitive interview session lasted approximately 60 min, and all of them were audio recorded. The study was conducted between May and October 2019 in different locations.

Table 5 Students' Computer Use in Different Contexts

		Grades 3–5		Grades 6–8		High school	
Computer use	Frequency	ELs	Non ELs	ELs	Non ELs	ELs	Non ELs
In school	Never	0	0	0	0	1	0
	Occasionally	4	2	1	0	3	0
	Frequently	9	3	7	5	4	5
At home	Never	7	0	3	0	2	0
	Occasionally	2	0	2	0	1	0
	Frequently	4	5	3	5	5	5

Note. ELs = English learners.

A total of five bilingual interviewers participated in the study. All the interviewers were trained to conduct the one-on-one cognitive interview sessions 1 week prior to the beginning of the study. The training sessions gave all interviewers an opportunity to become familiar with the goal of the study; the Winsight assessments; the item types; the online tools; and data collection protocols, materials, and processes.

We used a cognitive interview protocol to guide the cognitive interviews. The interview protocol included background questions about the students' English and Spanish language proficiency, mathematics knowledge, experiences using computers and exposure to technology-enhanced assessments. The cognitive interview protocol also included questions at the end of each item, at the end of each test section for the Winsight ELA items (reading, writing mechanics, and listening), and at the end of the session. These questions asked the students about the directions, the texts, the questions, the options, the different item types, the online tools, and how they interacted with the platform and the equipment (laptop, headphones). The researchers also asked follow-up questions as needed to collect additional information about the students' use and interpretation of the items and online tools.

The researchers also observed the students while they were completing the Winsight items. The researchers used rating scales and notes to document if the students had any difficulties completing the items, if they were able to complete the item independently, whether they were able to select or enter a response, and whether they were able to use the online tools (rating scale: no, partially, and yes).

Data Analysis

Each interviewer entered the data from the cognitive interviews into a coding sheet in Microsoft Excel. The interviewers used their notes and the interview audio recordings to complete the coding sheets. The coding sheet included information for each item. For example, how the students interacted with the platform, the directions, the layout, any stimulus material, the questions, the options, the online writing tool (for the constructed response writing item), the online universal tools, and the item type. The coding sheet also included information about the students' perceptions of the platform, items, and online tools. This allowed for the data for each item and online tool to be examined using a similar and consistent method.

We summarized descriptive statistics of the rating scores and students' backgrounds. In addition, we analyzed all the qualitative data (field notes, interview data, ratings, and interview responses) using grounded open coding (Charmaz, 2014). Each of the two researchers read and coded the data independently to identify recurring themes and then met to compare and discuss their individual coding. Disagreements were resolved through discussion until consensus was reached (Strauss & Corbin, 1990). Some of the themes that were identified included the following: how students interacted with the test and the platform (e.g., the directions, test navigation, and usability issues), how students interacted with each of the item types available in the ELA and mathematics test forms, how students interacted with the online tools, how students interacted with the pop-up glossaries, and how the students interacted with the mathematics items with the language toggle function. Based on these findings, we provide suggestions for improvement.

Findings

In this section, we present the findings of the study organized according to the research questions. Included is information about the problems that students encountered while completing the Winsight ELA and mathematics test forms, the online tools, the pop-up glossaries, and the mathematics items with the language toggle function.

Research Question 1: Did the EL Students Encounter Issues or Challenges Interacting With the Online Winsight ELA and Mathematics Items That Might Introduce Construct Irrelevant Variance into Their Test Scores?

In this section we summarize the problems the students encountered while completing the Winsight ELA and mathematics items, how they interpreted the directions (i.e., for the assessment interface, the online tools, the tests, the test sections, and the items), how they navigated through the items, how they entered their responses, and the difficulties they had completing the items independently.

Difficulties Understanding the Directions

Only one student, a non-EL student who completed the Grades 3 – 5 forms, was unable to read any of the directions in English in both the ELA and mathematics test forms. This student had only been in the United States for 6 months and explained that she is still learning to read in English. The other 43 students, both ELs and non-EL students, were able to understand all the directions on the ELA and mathematics test forms (e.g., how to navigate through the items, how to use the online tools, what to do in each item). Although 14 EL students stated that there were a few words or phrases they did not understand in the item directions (e.g., *compose, list of choices*), they explained that not knowing these words or phrases did not interfere with their overall comprehension of what they needed to do to complete each item (i.e., understand what the question is asking them to do, how to enter or select their response). Both EL and non-EL students stated that the directions on how to use the online tools were clear because they included the icons for each of the tools and this helped them locate the tools on the screen. As far as understanding the directions in Winsight mathematics items with language toggle, the 20 students who read the items in Spanish stated that the directions were very clear.

Twelve EL students commented that they liked that certain words in the directions were highlighted in bold (e.g., "What is the **main** topic of the discussion." "Select **three** correct answers." "Select **all** that apply."). They commented that this was very useful and helpful because it signals something they need to pay attention to (e.g., the number of options they need to select). However, not all the items in the Winsight ELA and mathematics assessments had highlighted words in the directions. These students stated they would like to see this formatting used more often in the assessments.

Eight students, including two non-EL students, were confused because they were not sure if they could listen to the passage again in each listening item. Students are instructed to listen to the passage only once at the beginning of the listening section of each ELA form. However, these same directions and the passage are always available for each item in the listening section. Moreover, there are no clear directions on whether students can take notes while they listen to the passage. Six EL students asked if they could take notes after they read the directions.

Difficulties Navigating Through the Items

The students did not report having any difficulties navigating through the items in the ELA and mathematics forms. All the students were able to navigate through all the items, including the 12 EL students who do not have access to computers at home. These students commented that they have access to computers at school and had all previously taken at least one test online. They all stated that the assessment interface and the navigation buttons on the Winsight item sampler were very similar to the interface and navigation buttons on other online tests. Consequently, all the students knew which buttons to click to move from one item to the next and to go back when needed. They also knew how to split the screen and how to use the scroll bar to move up and down when reading the text in the ELA test forms and when reading items have long prompts or have multiple parts in the ELA and mathematics test forms.

Difficulties Selecting and Entering Responses

All the students were able to select or enter their responses to complete the items in the ELA and mathematics forms (in English and in Spanish). Both ELs and non-EL students commented that they had already seen these types of questions on other online assessments, so they knew what they needed to do to respond. Only three students (two ELs and one non-EL) who completed the Grades 3 – 5 forms had difficulties at the beginning of the mathematics items because they did not realize these were drag-and-drop items and were trying to click on the options and then click on the empty boxes.

These students all quickly realized on their own that they needed to drag the items to the empty boxes. Similarly, five high school students (four ELs and one non-EL) had some difficulties with the graph items in the mathematics forms and did not know how to enter the function in the grid. However, these students had difficulties with this type of item because they did not read the directions carefully. Once they were instructed to read the directions, it was clear for them what they had to do to enter the graph in the grid. Moreover, most of the students (both EL and non-EL students) asked for scrap paper at the beginning of the mathematics test form. Some of them explained that they were more comfortable using scrap paper when attempting to solve mathematics problems and that was how they did it in class.

Except for the student who had arrived in the United States 6 month ago and completed the Grades 3–5 ELA form, the rest of the students were able to type a response and edit their texts (e.g., fixed typos, misspellings, capitalization, punctuation) to complete the extended response item in the ELA forms. Seventeen students asked about the options in the text editor menu (i.e., undo, redo, cut, copy and paste) as these tools are not labeled. Two students tried to use these tools but were unable to copy and paste. Five high school students copied and pasted text using the keyboard shortcuts (Ctrl+C and Ctrl+V). None of the students used the menu option to edit their texts and used the backspace key instead.

Similarly, all the students were able to complete the extended response item on the mathematics test forms. Most students used the mathematics functions in the equation editor, although they were not familiar with all of the available functions as they were not all labeled. Only one EL student who completed the Grades 3–5 test form was not able to use the mathematics functions in the equation editor. This student was not able to find the fractions symbol in the equation editor, so he typed the fraction manually using the slash symbol on the keyboard (e.g., 3/4).

Difficulties Completing the ELA Items

Twenty-two students (19 EL students and three non-EL students) encountered problems while completing the items in the ELA forms. The main issue was having to scroll up and down to move between the prompt and the response box and between the prompt and the text to complete the extended response item. These students commented that the text was too long, so it was difficult for them to find information in the text to answer the questions. However, we found that eight non-EL students used different strategies to help them complete the reading items. For example, one of the non-EL students who completed the Grades 3–5 form used the highlighter to mark important parts in the passage, and this helped him find the answers to the reading items. Similarly, the other seven non-EL students (three in Grades 6–8 and four in high school) copied and pasted the prompt in the writing area to avoid scrolling up and down to read the prompt and their response in the writing area. This also helped them complete the extended response item faster.

Seven EL students also had difficulties completing the items in the listening section. One of the ELs students who completed the Grades 3–5 form explained that she was not able to understand the listening passage at all. This participant was the EL student who had arrived in the United States 6 month ago. Five students (three in Grades 3–5 and two in Grades 6–8; all with intermediate English language proficiency) stated that the listening passage was too long for them, so they became distracted while listening to the audio and therefore forgot some of the information. Similarly, an EL high school student with low English language proficiency commented that she had problems understanding some of the words in the passage.

Difficulties Completing the Mathematics Items

Both EL and non-EL students also had some difficulties completing the items in the mathematics form; however, these problems were not related to language. The main problem was that students lacked the mathematics knowledge to complete many of the items. Students commented that they had not learned some of these topics yet or simply forgot them. For instance, there were some math-related words or terms the students did not understand, both in English and Spanish (e.g., *rounded, distributions, prism, exponents, quadrilateral*) or mathematics notations (e.g., $\angle ABD$, function Q[p]). Not knowing the meaning of these mathematics terms impeded the students from understanding how to solve some of the problems. Also, a few students who completed the Grades 3–5 forms had difficulties with computational skills (e.g., multiplications, divisions), even when they knew how to solve the problem. We observed the same difficulties when students completed the items in Spanish. Despite these difficulties, students seemed enthusiastic and tried very hard to answer the questions to the best of their abilities.

Research Question 2: Did EL Students Use the Available Online Tools and Accessibility Features in the Winsight ELA and Mathematics Items, and Were Those Tools and Features Perceived as Helpful?

In this section we summarize how students used the online tools, the math-related online tools, and the pop-up glossaries in the reading passages on the ELA forms. Their perceptions of the online tools and accessibility features are also discussed.

Use of Online Test Tools

The online test tools were not used very frequently by the students in this study (either by EL or non-EL students). Only 14 (five ELs and nine non-ELs) of the 44 students who participated in this study used some of the tools sporadically. The highlighter was the most commonly used online tool; it was used by nine students (two ELs and seven non-ELs). Students used this tool mostly while they were completing the reading items to highlight important information in the text. These students commented that this tool was very useful because it helped them find information in the text to answer the reading questions. The other tools were not used very frequently. For instance, the zoom, bookmark, and notes tools were each only used once. Three students used the line reader to help them read the text; five students used the answer eliminator tool to help them complete some of the selected response items. Students commented that they liked having these tools and could use them whenever needed. They also commented that they were familiar with all these online tools as they had seen similar ones in other online assessments, so they knew what these tools were for and how to use them.

Use of Math-Specific Online Test Tools

As mentioned earlier, the protractor and ruler tools were not used as none of the items required students to use them. Only students who completed the Grades 6–8 and high school forms used the math-specific online tools (reference guide and calculator) to complete some of the items in the mathematics forms. Five students (four ELs and one non-EL) used the reference guide. These students mentioned that the reference guide was somewhat useful because it contained formulas to answer some of the items. However, they noted that the reference guide did not include all the formulas needed to answer all the items. More students used the calculator; 14 students (seven ELs and seven non-ELs) used this tool. These students noted that the scientific calculator was very useful because it helped them make difficult calculations and allowed them to complete the items faster. The students that used the math-specific online tools explained that these were very easy to use and added that these math-specific online tools were like the tools available in other online assessments they had taken in the past. They also liked that the math-specific tools were always available and that they could use them whenever needed.

Use of Pop-up Glossaries in the ELA Reading Texts

The pop-up glossaries were used by both EL and non-EL students in this study, but they were not used frequently. The majority of the students who did not use the pop-up glossaries stated that they did not need to use them (16 students) or simply forgot about them (10 students). In this study, students used the glossaries whenever they did not understand the meaning of the glossed words or phrases, or they used them to clarify their meaning. In the Grades 3–5 form, only five students (three ELs and two non-ELs) used the pop-up glossary for "raring to go" whereas only three students (two ELs and one non-EL) used the glossary for "cannonball." The pop-up glossaries were used more frequently in the Grades 6–8 forms. Nine students (five ELs and four non-ELs) used the glossary for "thiamine," eight students (five ELs and three non-ELs) used the glossary for "deficiency," 11 students (six ELs and five non-ELs) used the glossary for "voracious," and 12 students (seven ELs and five non-ELs) used the glossary for "hand-cast." Finally, only four students (three ELs and one non-EL) used the pop-up glossary for "a bit of chaff in a tempest" in the high school form. All the students who used the pop-up glossaries stated that these were very useful because it helped them understand the meaning of the glossed words or phrases or it helped them confirm the meaning when they were unsure. However, these students also commented that the pop-up glossaries were not very useful in helping them understand the overall meaning of the reading passage. The EL students commented that there were other words, in all the ELA forms, that they did not understand in the reading passages. They added that they would have liked to have pop-up glossaries for these words as well. Some of the words they did not understand in the reading passages included phrasal verbs (e.g., *pile into*, *thundering down*, *huddle around*, *sweep over*, *sweep away*), idiomatic expressions (e.g., *flushed scarlet*), and words with multiple meanings (e.g., *browsing, leaning*).

Table 6 Languages Used to Complete the Items With the Language Toggle Function

Form	*N*	Only English	Only Spanish	Both languages
Grades 3 – 5	13	6	1	6
Grades 6 – 8	8	2	4	2
High school	8	1	5	2

Research Question 3: Did the Students Use the Language Toggle Function for the Winsight Mathematics Items, and Was That Function Perceived as Helpful?

Next, we summarize how EL students used the toggle function in the Winsight mathematics items and the languages they used to complete the items. We also discuss how the students perceived the use of the language toggle function.

Accessing the Language Toggle Function

None of the EL students realized what they had to do to toggle between English and Spanish because the button they had to click was not labeled. However, once we showed the EL students where this button was, they had no difficulties toggling between languages, if they needed to do so. Of the 29 EL students, 20 (seven in Grades 3 – 5, six in Grades 6 – 8, and seven in high school) used the language toggle function.

Languages Used to Complete the Bilingual Mathematics Items

Table 6 provides information about the languages that EL students used to complete the mathematics items with the language toggle function. Of the 20 students, 10 (one in Grades 3 – 5, four in Grades 6 – 8, and five in high school) used the language toggle function to complete all the items in Spanish. The fourth-grade student had only been in the United States for 6 months. She stated that she was still learning English and felt more comfortable completing the items in Spanish. The four students who completed the Grades 6 – 8 form also stated they felt more comfortable using Spanish because that was the language that they used the most and felt they could read better in Spanish than in English. The five high school students were in a bilingual program and their mathematics class was in Spanish. They commented that they answered all the items in Spanish because that was the language in which they were learning mathematics and they felt more comfortable using Spanish.

The other 10 students (six in Grades 3 – 5, two in Grades 6 – 8, and two in high school) were able to toggle back and forth between English and Spanish. Six of them viewed the item in both languages but submitted all their responses in English. They commented that they used both languages because they understood some words or questions better in English and others better in Spanish. However, they felt more confident and comfortable responding in English.

The other four students answered some items in English and others in Spanish. They explained that they tried to answer first in English, and if they had any difficulties, they would switch to Spanish.

Students' Perceptions of the Mathematics Items With the Language Toggle Function

All 29 EL students liked that the language toggle function was available in the mathematics items, even if they did not use it in this study. The 10 students who completed all the items in Spanish particularly liked the language toggle function. What they liked the most was that they could use Spanish to complete the items, if needed. They were all more comfortable reading and responding to the items in Spanish. They commented that this was the language they spoke the most and had also learned mathematics in Spanish. One of the students commented the following when asked to compare the mathematics items in English with the ones in Spanish. She stated, "Tasks are much easier for me in Spanish. Even if I am not sure how to answer a question, I can try my best."

Similarly, the 10 students that used both English and Spanish to complete the items with the language toggle function stated they liked this function a lot. They commented that they spoke both languages and felt comfortable using either one. Finally, the nine students who never used the language toggle function stated that they never tried viewing the items in Spanish because they felt more comfortable completing the items in English as they had never had mathematics instruction

in Spanish and had never taken a mathematics assessment in Spanish. They also commented that although they spoke Spanish at home, they felt they were not very good at reading and writing in Spanish. They all said that viewing the questions in both English and Spanish could be very useful for students who speak Spanish and are still learning English.

Discussion

In this study, we examined how a group of EL students interacted with a sample of Winsight ELA and mathematics summative items with embedded online tools and accessibility resources and the problems they encountered while completing the items. In the first research question, we examined if, when interacting with the online Winsight ELA and mathematics items, EL students encountered issues or challenges that might have introduced irrelevant variance into their test scores. We found that for the most part, the directions on the Winsight ELA and mathematics items were clear for all but one EL student. Even though a few EL students did not understand a few words or phrases in the directions, they were able to understand what they needed to do to complete each item. The only directions that were not very clear were the directions for the listening section in the ELA items. It was not clear in the directions if students can listen to the passage more than once or if they can take notes while listening to the passage. All of the students were successful navigating through the items and selecting and entering their responses. Because the students have already taken online assessments, they were all familiar with the navigation buttons, online tools, and item types as these were similar to the ones on other online assessments frequently used in US schools.

Some EL students had difficulties completing the reading items on the ELA forms mostly because they had to toggle between the items and the text. This action became tedious for some of the students, and a few were frustrated because it was difficult to find the information in the text to answer the questions. Finally, we found that EL students had some difficulties completing the items in the mathematics forms. Although the students were able to understand what the problem was asking them to do, they often lacked the mathematics knowledge needed to solve the problems or did not understand some of the mathematics terms in the questions (e.g., quadrilateral).

In the second research question, we sought to investigate if the EL students used the available online tools and accessibility features in the Winsight ELA and mathematics items and if those tools and features were perceived as helpful. We found that both EL and non-EL students used some of the available online tools appropriately although not frequently. However, this was expected as students were not required to use any of them. These tools were easy to use mainly because they were like other online tools found in any online assessment. Consequently, students were able to use them without any difficulties. Students also perceived them positively and found them to be very useful. We also noticed that a few students were very resourceful and used other features in unanticipated creative ways to help them complete the items, particularly the reading items in the ELA forms. For example, a few students used their fingers or the cursor to help them read the text instead of using the line reader tool. Other students used the split screen functionality to make the text or questions bigger instead of using the zoom tool whereas others copied and pasted text from the prompt and the reading passage to help them complete the extended response item faster. Nonetheless, we think EL students could have used some of these online tools or other features in the assessment platform while they were completing the reading items to make this part of the assessment less cumbersome. For instance, they could have used the highlighter to mark important parts in the text or they could have used the copy and paste function to copy information from the text to write their responses.

As far as the pop-up glossaries, we found that the students did not use them frequently, as found in other studies (e.g., Wolf et al., 2012). Nonetheless, we found that both EL and non-EL students were able to use the pop-up glossaries in the three ELA forms. They used the pop-up glossaries to find the meaning or to confirm the meaning of the glossed words. However, there were other words and phrases in the text that students did not understand, and they would have liked pop-up glossaries for these words or phrases. In particular, the students had problems with many of the phrasal verbs, idiomatic expressions, and words with multiple meanings in the texts. Similar to what was reported in other studies (e.g., Lopez et al., 2019; Turkan et al., 2019), we found that the pop-up glossaries were very useful in helping students understand the meaning of the glossed words or phrases (local meaning); however, they were not very useful in helping them understand the overall meaning of the text (global meaning).

Finally, the third question examined if the students used the language toggle function for the Winsight mathematics items, the languages they used to complete these items, and whether that function was perceived as helpful. Many of the students in this study used the language toggle function to complete the last seven items in the mathematics forms. Although they were not able to locate the language toggle button on their own, none of the students had difficulties

switching between languages whenever needed. Like in other studies (e.g., Lopez, 2020; Lopez et al., 2019), we also found that all the EL students were able to determine which languages to use, and some chose to use only one language (English or Spanish) or to use both within or across items. The language students used to complete the items depended a lot on their language preference, the language they felt more comfortable using, or the language used to learn the different mathematics topics. Moreover, all the students reported that they very much liked having the language toggle function, even if they did not use it at all. They also thought this function was very useful because it allowed them to use English, Spanish, or both. We believe EL students could greatly benefit if they are able to tap into all their linguistic resources to demonstrate what they know and can do in a content area (García & Wei, 2014; Lopez et al., 2017; Otheguy et al., 2015).

The findings from the cognitive interviews with EL students who participated in this study could be used as evidence to support some of the subclaims in the Winsight summative assessment validity argument (Stone & Wylie, 2019). In particular, this study contributed empirical evidence that supports that the Winsight summative assessment is accessible to EL students and allows them to demonstrate their knowledge and skills fairly and equitably. For example, we found that the available accessibility and accommodation features (e.g., pop-up glossaries, online tools and toggle function) supported EL students in understanding the directions and accessing the content and language of the items. Moreover, the EL students were able to navigate through different technology-enhanced item types and were also able to select and construct their responses to demonstrate what they know and can do in ELA and mathematics.

Recommendations for Test Development

Next, we present a set of recommendations based on the findings to support EL students in understanding the directions, navigating through the items, and selecting and entering their responses. To ensure EL students are prepared to take the Winsight ELA and mathematics summative assessments, we suggest the following steps:

- Develop tutorial videos in addition to the existing practice tests (i.e., the Winsight Item Sampler). The tutorial video could include information on how to navigate through the items, how and when to use the online tools, the different item types available, and the functions on the extended response items (ELA and mathematics). The tutorial video could be offered in Spanish as well. Ideally, students should watch the tutorial video prior to completing the item sampler.
- Consider making all directions available in Spanish in the mathematics forms with the language toggle function. Currently, the directions for the information area, navigation area, split controls, and online test tools are presented only in English.
- Consider developing other summative mathematics forms with the language toggle function in other common home languages (e.g., Arabic, Korean, Chinese, Vietnamese, etc.).
- Consider consistently highlighting important words in the directions across items.
- Provide permanent labels for all the navigation buttons, including the ones in the forms with the language toggle button. The labels in the Spanish version should be in Spanish.
- Consider adding labels to the functions in the response area for the ELA extended response items (e.g., undo, redo, cut, paste).
- Consider allowing EL students to take notes to complete the Winsight ELA listening items. If this is possible, make this very explicit in the directions.
- Consider allowing EL students to use scratch or scrap paper to do computations and to draw out problems in the Winsight mathematics items. If this is possible, it should be stated explicitly in the test directions.
- Consider increasing the number of words or terms that are glossed in each reading passage and using bilingual glossaries in the mathematics assessment forms (i.e., standard version with no language toggle function). However, more empirical evidence is needed to validate this suggestion.

Limitations and Future Research Directions

We would like to note several important limitations to this study. First, we used a convenience sample with which to conduct our study. Although we had planned to recruit a more representative sample of EL students for each grade level form in terms of their English language proficiency, we were able to recruit only participants who were readily available

to us. This resulted in having an imbalance between EL students with low English language proficiency and high English language proficiency, particularly in Grades 3–5 and Grades 6–8. Another limitation is that the students' English and Spanish proficiency were determined by students' self-ratings and not using other measures such as scores on standardized language proficiency assessments or teachers' ratings. Nonetheless, we were able to recruit EL students at different English and Spanish language proficiency levels to complete each of the three ELA and mathematics forms. The resulting sample provided useful information to understand potential problems ELs could have when completing Winsight summative assessments. Future research could build on the present study but should include a more balanced sample in terms of both English and Spanish proficiency and should use more reliable measures to determine the English and Spanish language proficiency level of the students.

Second, the pop-up glossaries were examined only in the reading porting of the ELA forms; however, the number of glossaries in each text was very low. Additional evidence is needed to validate the use of pop-up glossaries in the Winsight summative assessments. Future studies should continue examining the use of pop-up glossaries in both the ELA and mathematics items. A few areas of interest include increasing the number of words or terms that could be glossed in each reading passage, and the use of bilingual glossaries in the mathematics assessment forms. Other types of EL accommodations could also be explored to support EL students in completing both the ELA and mathematics forms (e.g., reading aloud the directions and the prompts).

Third, the Winsight ELA and mathematics items were not used for summative purposes in the context of an operational accountability assessment. Future research should examine how EL students interact with the Winsight ELA and mathematics assessments when used operationally to assess whether students have met grade-level expectations in ELA and mathematics. Areas of interest include examining how ELs perform on these assessments; how ELs use the available online tools and accessibility features; how ELs use the langue toggle function in the mathematics assessments; and the relationship between language use and other variables such as English language proficiency, Spanish language proficiency, language preference, and language of instruction.

Conclusion

Despite the limitations described above, we were able to collect rich, in-depth information through observations, interviewer notes and ratings, and interview responses. This information pertained to how the students interacted with (a) the Winsight ELA and mathematics items, (b) the online tools, and (c) the accessibility features. We also documented (a) the difficulties that test takers had completing the items and (b) their perceptions of the items, the online tools, and accessibility features. The findings from this study are encouraging and suggest that for the most part, the directions and items on the Winsight ELA and mathematics assessments are clear and appropriate for EL students. We observed that EL students can complete the items on their own and are able to demonstrate their ELA and mathematics knowledge and skills. Based on these findings, we provide recommendations on how to prepare EL students to complete the Winsight summative assessments, including using tutorial videos and practice items. We also make recommendations to improve the directions, and we suggest additional types of supports that could be embedded for ELs.

Note

1 Winsight Item Sampler: https://ws.nextera.questarai.com/tds/#practice

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