

Adaptive Problem-Solving In a Digital Environment

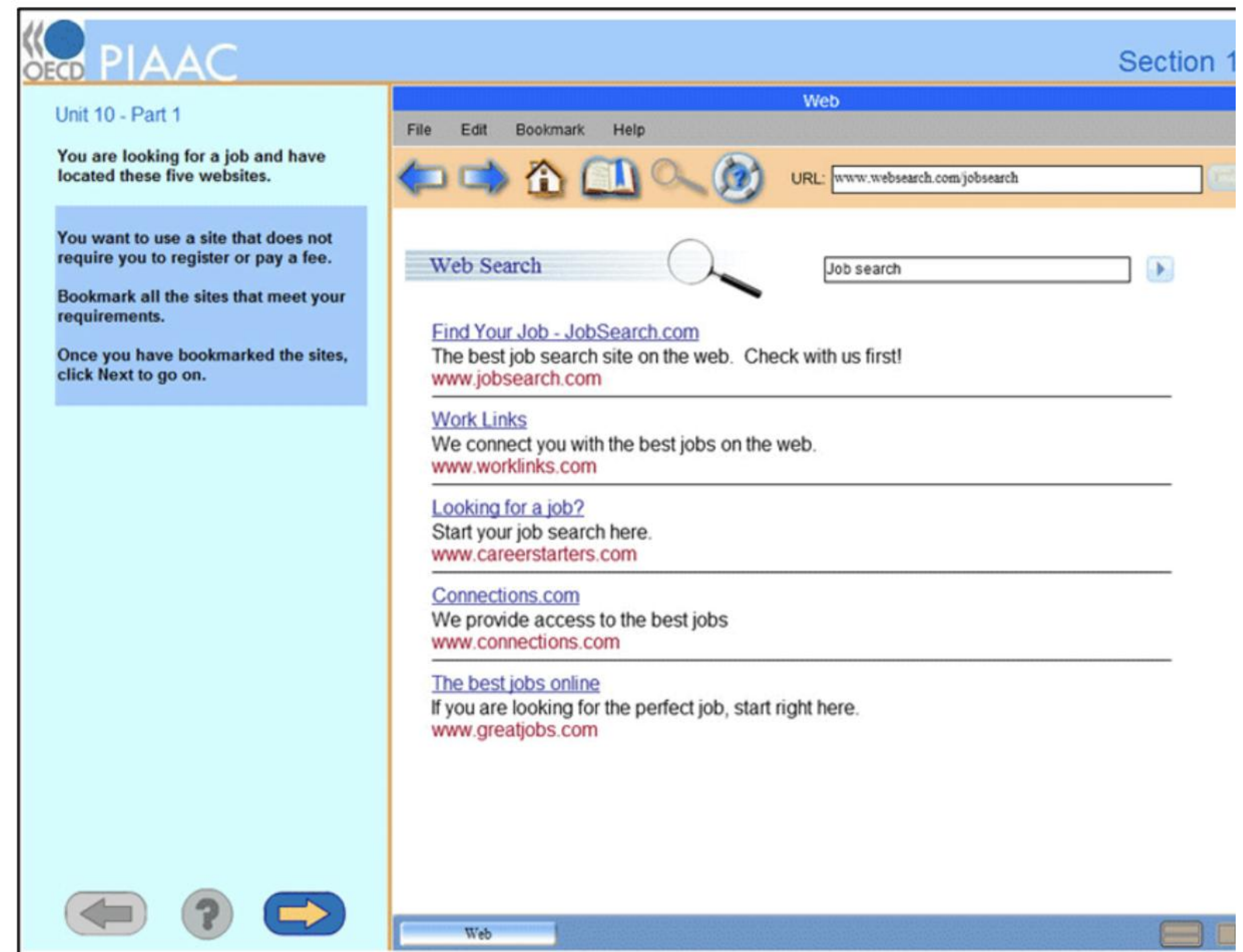
Gal Kaldes & Elizabeth L. Tighe
Georgia State University



Problem Statement

- Technology and use of problem-solving skills are pervasive in educational and workforce settings.
- Limited research to understand adults' gaps in digital literacy skills, especially for those who already have challenges with basic literacy and computer skills

Figure 1: Opening screen of job search task



Sample of Adult Test-Takers



- PIAAC Cycle 1 (2012/2014)
- 1,338 adult respondents
- 48.4% lower literacy (Level 2 and below)
- On average, higher literacy respondents had higher ICT at home
- Demographics:
 - 46.9% male
 - 9.30% below HS, 40% HS, 50.70% above HS
 - Average age = 39.2 years

PIAAC APS

- **Adaptive Problem Solving (APS)** includes solving problems in **technology-rich environments**.
- APS tasks often assume **basic literacy and foundational digital skills**, including navigating interfaces, typing, and using common computer functions.
- Research suggests adult literacy learners may struggle with **basic digital skills** (Olney et al., 2017).



Literacy Skill Scale

Below Level 1 (0-175)

Locate single piece of information in familiar texts.

Level 1 (176-225)

Read relatively short digital, print or mixed texts to locate single text.

Level 2 (226-275)

Make matches between text and information that may require low level paraphrasing and drawing low-level inferences.

Level 3 (276-325)

Identify, interpret, or evaluate one or more pieces of information and often require varying levels of inference.

Level 4 (326-375)

Perform multiple-step operations to integrate, interpret, or synthesize information from complex texts, and may require complex inferences.

Level 5 (376-500)

Integrate information across multiple, dense texts; construct syntheses, ideas or points of view; or evaluate evidence based arguments.

<https://nces.ed.gov/surveys/piaac/>

PSTRE Item U19a

- **Environment:** spreadsheet and email
- **Task:** identify a specific club member ID from a spreadsheet and then send it to a correspondent in an email environment.
- **Tools:** searching, sorting, copying, pasting
- **Buttons:** menu items, buttons on toolbar

OECD PIAAC

Section 1

Unit 22

You want to copy some music files to your portable music player.

The music player has room for 20 MB and you want as many files as possible. You want to include only jazz and rock music.

Select the files to include.

Once you have selected the files, click Next to continue.

Spreadsheet

	Title	Size	Time	Artist	Genre
☐	A Foreign Affair	14.8 MB	11:40	Don Rader Quartet	Jazz
☐	About the Blues	4.3 MB	3:08	Julie London	Blues
☐	Another Mind	7.8 MB	8:44	Hiromi Uehara	Jazz
☐	Blue Trane	10 MB	9:03	John Coltrane	Jazz
☐	Don't Give up on Me	3.5 MB	3:45	Solomon Burke	Blues
☐	Far Out	5.3 MB	5:25	Antonio Farao	Jazz
☐	Fire and Water	5.3 MB	4:00	Free	Blues
☐	If	4.9 MB	5:48	Myriam Alter	Jazz
☐	X	2.2 MB	3:04	INXS	Rock
☐	Inclined	7.1 MB	5:59	Carol Welsman	Jazz
☐	On an Island	16 MB	6:47	David Gilmore	Blues
☐	Pass It On	3.1 MB	3:36	Albert Calvo	Jazz
☐	Raindrops, Raindrops	5.2 MB	3:46	Karin Krog	Jazz
☐	Say You Will	8.8 MB	3:47	Fleetwood Mac	Rock
☐	Skin Deep	7.1 MB	4:28	Buddy Guy	Blues
☐	Speak No Evil	6.9 MB	5:13	Flora Purim	Jazz
☐	The Other Side of Blue	6.5 MB	5:08	Jean Shy & Jobo	Jazz
☐	The Rise	7.3 MB	7:28	Julien Lourau	Jazz
☐	The Rising	4.5 MB	4:50	Bruce Springsteen	Rock

Total Size Selected (MB)

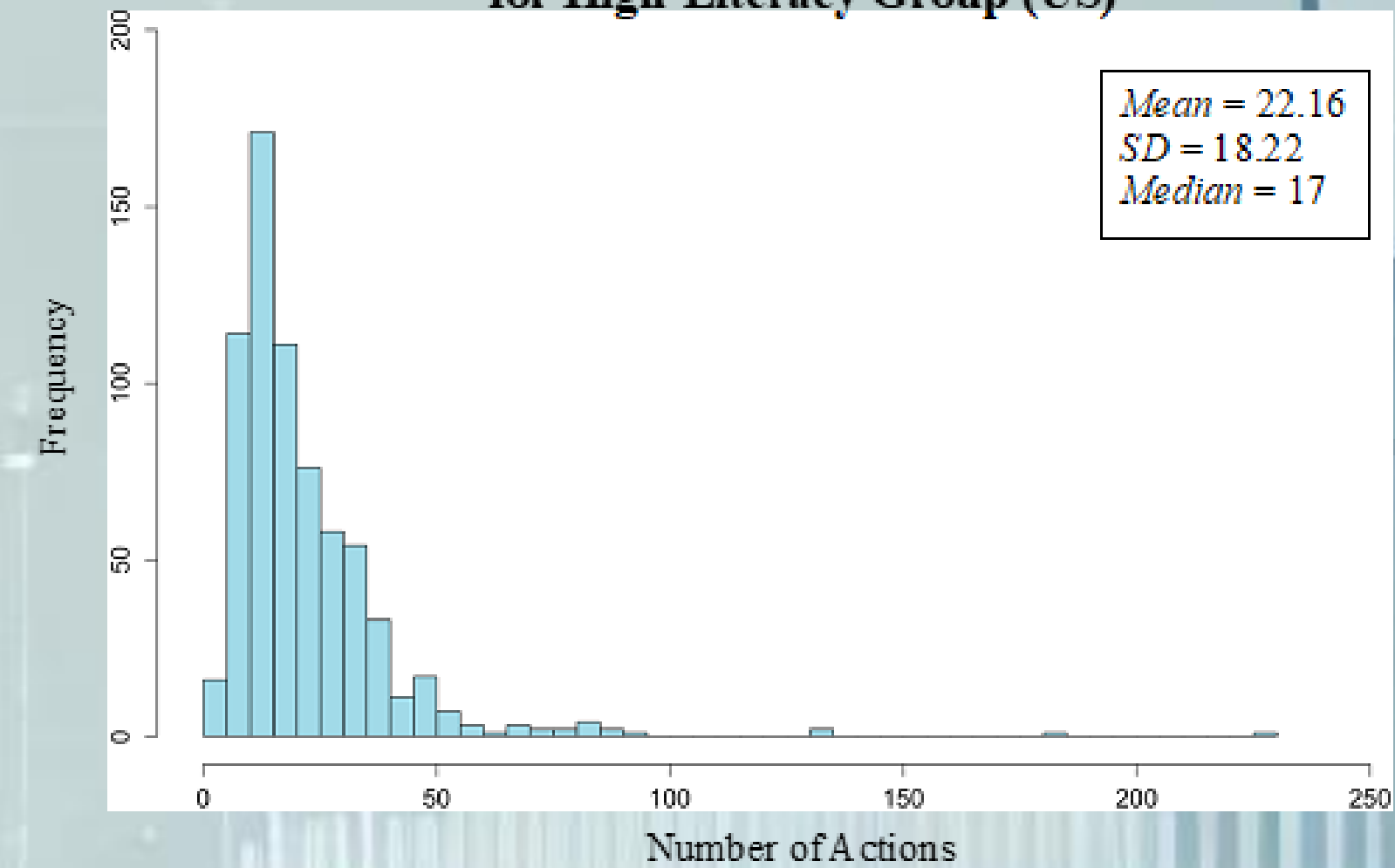
Spreadsheet

Results

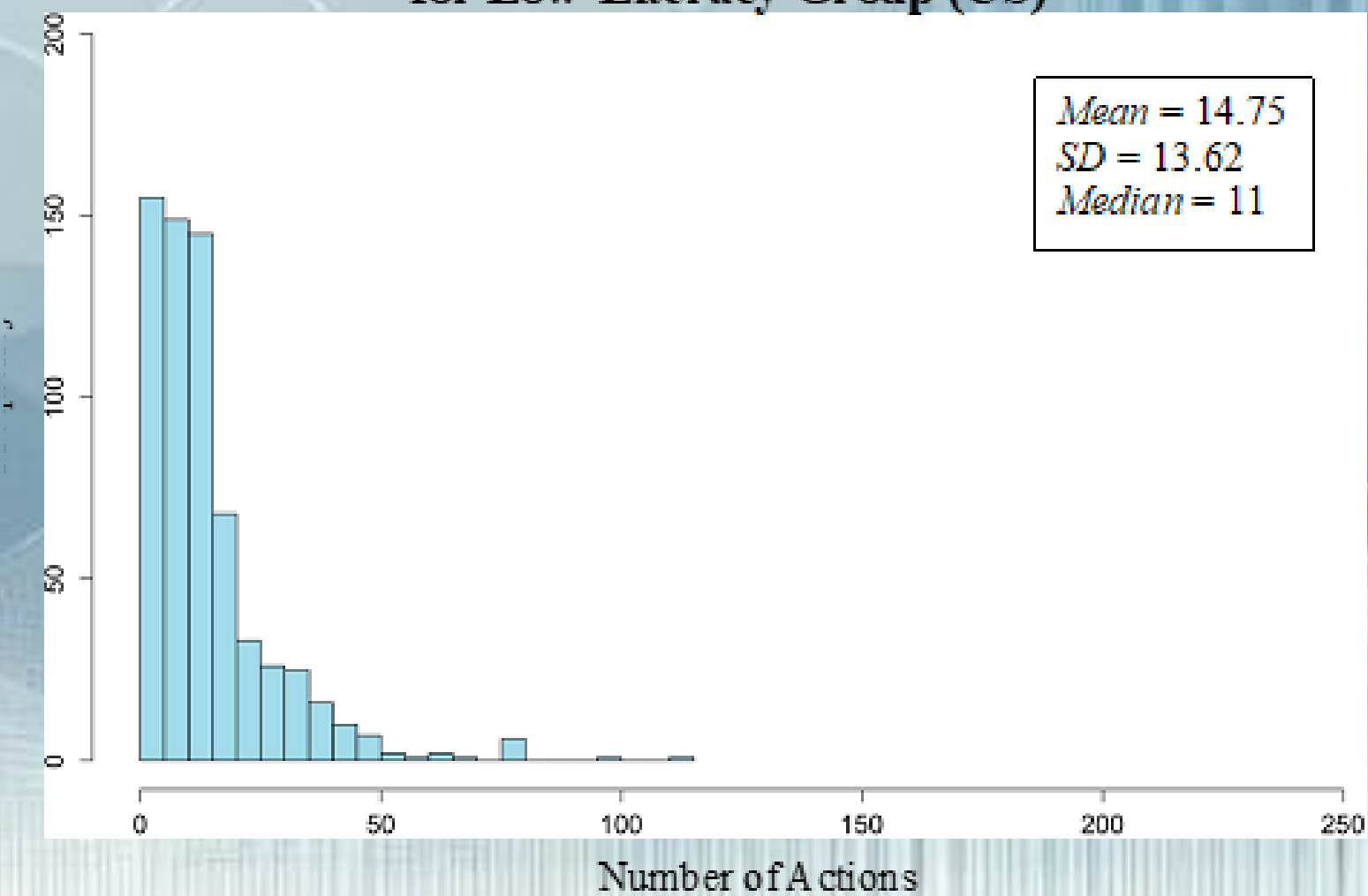


- Respondents in the low literacy group on average made fewer actions.
- Many respondents in this group performed either 0 actions or only 1 action.

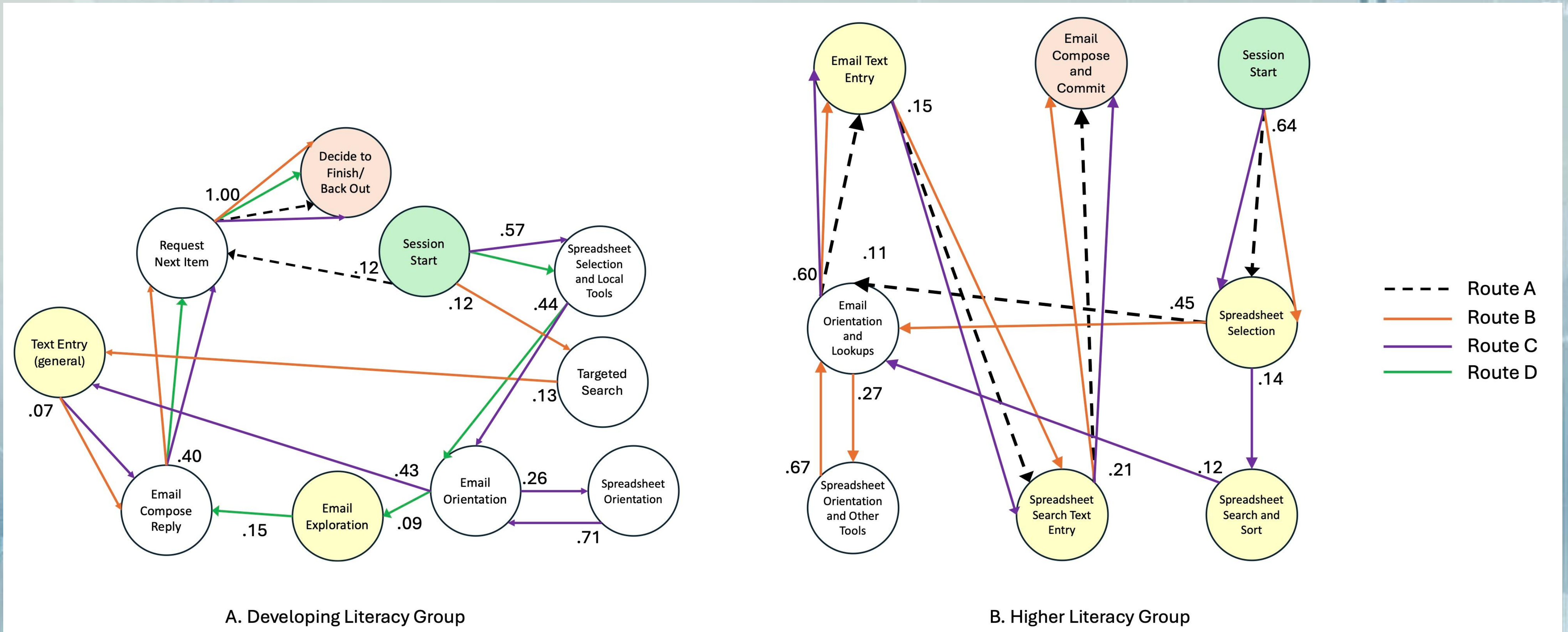
PIAAC U19a Action Sequence Lengths
for High-Literacy Group (US)



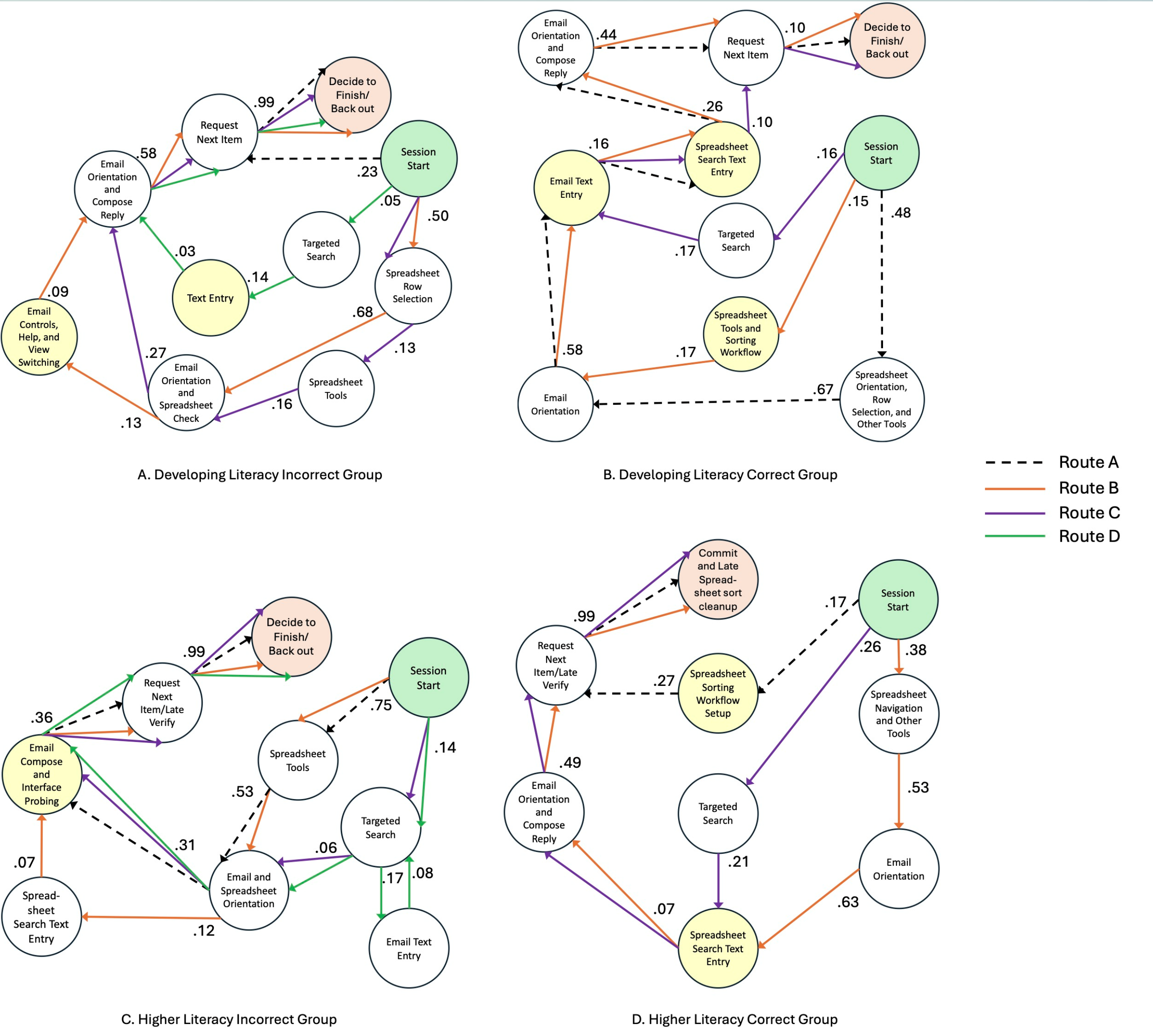
PIAAC U19a Action Sequence Lengths
for Low-Literacy Group (US)



Results



Results



General Implications

- Time allocation and action sequences (clicking behaviors) highlight the importance of deeper cognitive engagement.
- Sequences could directly translate into teachable routines
- treating digital problem-solving as a distinct competency means pairing literacy development with targeted technology routines
- Not only what adults know but how they move.

