2023 STAR Research Synthesis

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for U.S. Department of Education, Office of Career, Technical, and Adult Education

Summary

The STudent Achievement in Reading (STAR) project is a 16-year initiative by the U.S. Department of Education, Office of Career, Technical, and Adult Education (OCTAE) designed to assist States and local programs in making systematic and instructional changes required to improve the reading achievement of intermediate-level adult learners, including grade-level equivalents (GLE) 4.0–8.9, National Reporting System (NRS) levels 3 and 4, adult basic education (ABE), or English as a second language (ESL). STAR works with States, local programs, and teachers to provide training in evidence-based reading instruction (EBRI) and technical assistance in developing the systems and procedures needed to implement and sustain EBRI.

The overarching goal of this research synthesis is to update the STAR community on evidence-based reading research that may inform the STAR training or practitioners' instructional approaches. What follows is a thematic synthesis of a subset of the studies reviewed, all of which are focused on the theme of educational technology and remote learning, to prime practitioners who may be interested in learning more about the research areas explored in the articles.

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[1] Dr. John Sabatini has received Institute of Education Sciences grant funds to research both AutoTutor and Study Aid and Reading Assessment (SARA) instructional products, which are included or referred to in multiple studies included in this report. He does not receive personal compensation for their use or study.

Research Approach

The researchers conducted a review of EBRI articles and other scholarly documents on adult literacy that have been published between June 2022 and May 2023. A search was conducted using the terms “adult literacy” and/or “adult foundational education” in conjunction with “reading” and/or “literacy” in the Academic Search Premier (EBSCO) database. In addition, the authors searched Google Scholar to identify pre-prints, abstracts, and dissertations/theses that have not yet been published. Finally, we contacted several experts affiliated with the U.S. Department of Education’s Collaborative Research for Educating Adults with Technology Enhancements (CREATE) Adult Skills Network, which yielded more white papers and reports. In total, these searches yielded 7,680 papers, of which 15 were identified as relevant to STAR training or practitioners’ instructional practices. Six of the 15 specifically addressed educational technology and remote learning and are the focus of this research synthesis.

Note: The U.S. Department of Education does not endorse specific curricula, tools, or programs. While some of the following research discusses particular apps or tools, inclusion of this information does not constitute endorsement by the Department of any products or services offered or views expressed.

Thematic Synthesis of Educational Technology and Remote Learning and Implications for Practitioners

As we emerged from the pandemic, remote learning, educational technology, and digital literacy were all key issues explored in research. After decades with arguably limited uptake, the reality of lockdowns that closed program locations led to the rapid adaptation and acceleration of programs learning to use technologies to help support their learners at a distance and increased the use of various technologies within program settings. Already, the educational technology industry had started to flourish in K–12 educational settings, and adult education researchers took up the call to develop, experiment with, investigate, and document changes in technology in adult contexts.

As is often the case in adult education instruction, the research community that studies adult learners recognizes that we may never receive sufficient funding to study adult learning as thoroughly as researchers studying school-age learners. Consequently, we are often conducting research to examine whether we can adapt and apply results from these studies (i.e., what results from studying younger readers might apply to adults, and which results seem totally different). This helps us leverage both the research and the learning programs built for K–12. Some of the studies below take this approach, while others focus exclusively on adult education and adult learners.

Digital Technology Supports

One type of technology learning that is becoming popular is application-based systems, typically used on mobile devices such as smartphones and tablets. In the following article by Nedungadi and colleagues, the authors propose a theoretical digital learning ecology framework for adult literacy and then discuss how the design of a digital mobile learning tool, the Amrita Learning App, fits into that ecology.

"Towards a Digital Learning Ecology to Address the Grand Challenge in Adult Literacy" proposes a theoretical digital learning ecology framework for adult literacy and discusses the design of a digital mobile learning tool, the Amrita Learning App. The Amrita Learning App addresses the interaction between motivation, context, and design—with life-relevant storylines, high-low content, and scaffolded instruction (voice, audio, motivational games, Spanish translation)—with a goal of increasing engagement and persistence. A simplified user interface, ongoing training videos, and other features support its usability and feasibility to implement.

The authors conducted a yearlong field test that reveals promising results for non-native and native English-speaking adults with low literacy skills. The average length of a session was 9 minutes for native speakers and 16 minutes for non-native speakers. As might be predicted, non-native speakers used more supports, translations, and audio. The results support both their framework and the potential of phone apps to support adult learning.

Resource
Nedungadi, P., Devenport, K., Sutcliffe, R., & Raman, R. (2023). Towards a digital learning ecology to address the grand challenge in adult literacy. *Interactive Learning Environments, 31*(1), 383–396. https://doi.org/10.1080/10494820.2020.1789668

Intelligent Tutoring Systems (ITS)

Another type of technology-based learning system, ITS, has been developed over the years, though mostly for STEM (science, technology, engineering, and math) and computer science. One family of ITS uses conversational agents, that is, animated talking heads that interact with the student as they learn. One such system, AutoTutor for Adult Reading Comprehension (AutoTutor-ARC), was supported with funding from Institute of Education Sciences grants and is the subject of this and the next study reviewed. AutoTutor-ARC is a web-based tool with 30 lessons that teach reading comprehension strategies (predicting purpose, acquiring vocabulary, clarifying sources of confusion, evaluating and elaborating on ideas and claims in text, and summarizing texts). It is very interactive with two computer agents (a "teacher" and a fellow student). Data is provided for teachers and learners to see progress. These next two articles investigate the implementation of AutoTutor-ARC in a hybrid intervention (in class and via a digital AutoTutor-ARC tool).

In the study **"Importance of Learner Characteristics in Intelligent Tutoring for Adult Literacy**,**"** researchers analyzed pre- and post-component skill scores from a hybrid intervention (in class and digital AutoTutor-ARC system). This article focuses more on analyzing how clusters of different learners (four profiles) interacted with learning gains. The researchers used a statistical technique called cluster analyses to characterize learners' performance based on their speed and accuracy as they completed AutoTutor lessons. They identify four profiles: (a) proficient readers (accurate and fast); (b) conscientious readers (medium accuracy, but slow); (c) under-engaged readers (medium accuracy, but fast); and (d) struggling readers (low accuracy and slow).

Next, they examined learning gains by group. They find that most learners make gains in reading skills above the word recognition and decoding level. What the researchers

label as the "conscientious" reader group—those who perform slowly but accurately—tend to make the most substantial gains.

"**An Intelligent Tutoring System for Adult Literacy Learners: Lessons for Practitioners**" is based on the same implementation of the AutoTutor-ARC system and is written from the perspective of two researchers in a classroom of adult literacy students (third–eighth-grade reading levels). A description of AutoTutor-ARC from an educator/researcher perspective is provided as well as challenges/solutions to implementing this type of technology in ABE classrooms.

Because adults often have limited digital literacy skills, programs such as AutoTutor can provide web-based intelligent tutoring systems for them. AutoTutor provides performance data for both students and instructors to monitor progress. However, adequate technology, such as a stable Internet connection and up-to-date devices (with reasonable processing speed and power), are necessary to ensure a productive experience for learners. Thus, considerations for using a web-based reading tool at adult education sites include equipment (computers with fast enough speed/memory), fast Internet, and on-site technology specialists in case of web page blockers.

Resources

Hollander, J., Sabatini, J., Graesser, A., Greenberg, D., O'Reilly, T., & Frijters, J. (2023). Importance of learner characteristics in intelligent tutoring for adult literacy. *Discourse Processes, 60*(4-5), 397–409. https://doi.org/10.1080/0163853X.2023.2203543

Greenberg, D., Miller, C., & Gaesser, A. C. (2023). An intelligent tutoring system for adult literacy learners: Lessons for practitioners. *Adult Literacy Education, 5*(1), 36–42.

Technology as a Response to COVID-19 Restrictions

This pair of reports by the Evidence-Based Adult Education System task force members summarize interviews with adult education practitioners (adult education staff, program managers, instructional leaders) about their programs and practices wrought by the pandemic and how adult education has continued to evolve in terms of varying instructional modalities.

In the first report, "**New Directions for Adult and Continuing Education**," the authors note that in the early days of the pandemic, access issues were a dominant theme as most programs were unprepared to go fully remote and used extremely limited digital technologies, as were challenges with access to broadband services at home. Another central issue was the digital literacy skill preparedness of both learners and teachers. Still another concern was overcoming barriers (financial, emotional, and physical challenges) as well as administrative changes that altered class schedules.

The second report, "**The Rapid Response, Innovation, and Challenges of Sustainability in the Time of COVID-19: Reports from the Field**," picks up the story by reporting on findings 15–18 months later and how programs adapted to new technologies, instructional approaches, and challenges as a result of the pandemic.

By mid-pandemic (15–18-month follow-up), some programs were still operating fully remotely, some were HyFlex, and some in-person. Practitioners reported that many

learners enjoyed the convenience of online learning and did not want to go back to class, whereas others only wanted face-to-face contact. By this time, instructors felt more confident and competent in using digital platforms and tools but voiced concerns about equity issues surrounding access for learners, including access to devices, Internet, and digital literacy skills. Overall, many early challenges persisted even at the later follow-up, but many practitioners adjusted, and some even tried to find a "silver lining" in remote instruction.

Resources

Belzer, A., Leon, T., Patterson, M., Salas-Isnardi, F., Vanek, J., & Webb, C. (2022). From rapid emergency response to scaling and sustaining innovation: Adult foundational education in the time of COVID-19. *New Directions for Adult and Continuing Education, 2022*(173-174), 81–91. https://doi.org/10.1002/ace.20454

Belzer, A., Leon, T., Patterson, M., Salas-Isnardi, F., Vanek, J., & Webb, C. (2022). The rapid response, innovation, and challenges of sustainability in the time of COVID-19: Reports from the field. *Open Door Collective, ProLiteracy*.

Using Technology to Prompt Students

A long-standing issue in adult education is how best to support student engagement and motivation to persist in students' learning in the face of all the challenges of adult family, community, and career responsibilities. "**Nurturing and Nudging Adult Learners through Text Messaging: Final Report for the Technology-based Coaching in Adult Education (TBCAE) Project**," prepared for OCTAE, summarizes a low-cost text messaging coaching intervention (2019–2022) used with adult learners. The aim of the intervention was to understand and promote learners' engagement and persistence as mediators of successful learning. Program staff sent students individualized and personalized text messages to support them in moving forward in conducting varied activities to attain their immediate and near-term goals.

The researchers find that the text messaging intervention had a large and persistent effect on adult learners' attendance and literacy and numeracy performance. Feedback from staff and program directors also indicate that personalized/individualized text messages can help adult education learners move forward in short- and long-term goals (i.e., completing high school equivalency, gaining employment).

Resource

Alamprese, J. A., Cheng, I-F., & Silverman, A. (2022). *Nurturing and nudging adult learners through text messaging: Final report for the technology-based coaching in adult education (TBCAE) project*. U.S. Department of Education, Office of Career, Technical, and Adult Education. https://lincs.ed.gov/sites/default/files/tbcae-final.pdf