Thank you for your request to our REL Reference Desk regarding evidence-based information about comprehensive, Mac-based, remediation programs. The information below represents the most rigorous research available. Researchers consider the type of methodology and give priority to research reports that employ well described and thorough methods. The resources were also selected based on the date of the publication with a preference for research from the last ten years. Additional criteria for inclusion include the source and funder of the resource.

Our policy is that we do not endorse particular products. However, we have provided research and resources pertaining to computer-based remediation programs for math and language skills.

Question: *I am looking for a comprehensive computer based remediation program for students in an alternative school setting (grades 7-12). Our students are at risk for dropping out and they have large gaps in their math and language skills. Teachers continue teaching the curriculum at grade level (with differentiated instruction) in the alternative setting, hoping students can return to regular school. We need help identifying and addressing the learning gaps quickly. There should be a program that would test and target missing skills in an innovative format for distractible students, using Mac technology. … Can you help me find such a program?*

Search Process:

Key words and search strings used in the search:
Computer based remediation; Mac remediation program; assessment using Mac technology; Mac technology

Search databases and websites: Apple in Education; Turning Technologies; CAST National Center on Universal Design for Learning; Best Evidences Encyclopedia

Institute of Education Sciences Resources (IES): Regional Educational Laboratory Program; What Works Clearinghouse; National Center for Education Research; National Center for Education Evaluation and Regional Assistance

Other Federally Funded Resources: National Center for Technology Innovation

Search Engines and Databases: *Google, Google Scholar, ERIC*

Research on Technology Effectiveness

1. U.S. Department of Education. (2009). Read 180. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse. Retrieved from http://ies.ed.gov/ncee/wwc/interventionreport.aspx?sid=571

Source: Institute of Education Sciences What Works Clearinghouse
Link: http://ies.ed.gov/ncee/wwc/interventionreport.aspx?sid=571
Summary from the intervention report: "The WWC reviewed 101 studies on READ 180 for adolescent learners. Seven of these studies meet WWC evidence standards with reservations; the remaining 94 studies do not meet either WWC evidence standards or eligibility screens. Based on the seven studies, the WWC found potentially positive effects in comprehension and general literacy achievement for adolescent learners. The conclusions presented in this report may change as new research emerges."

2. U.S. Department of Education. (2010). Corrective reading. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse. Retrieved from http://ies.ed.gov/ncee/wwc/interventionreport.aspx?sid=121

   Source: Institute of Education Sciences What Works Clearinghouse
   Link: http://ies.ed.gov/ncee/wwc/interventionreport.aspx?sid=121
   Summary from the intervention report: "The WWC reviewed 129 studies on Corrective Reading for adolescent learners. One of these studies meets WWC evidence standards; the remaining 128 studies do not meet either WWC evidence standards or eligibility screens. Based on one study, the WWC found no discernible effects on alphabetics, reading fluency, or comprehension for adolescent learners. The conclusions presented in this report may change as new research emerges."

3. U.S. Department of Education. (2010). Fast forWord®. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, What Works Clearinghouse. Retrieved from http://ies.ed.gov/ncee/wwc/interventionreport.aspx?sid=173

   Source: Institute of Education Sciences What Works Clearinghouse
   Link: http://ies.ed.gov/ncee/wwc/interventionreport.aspx?sid=173
   Summary from the intervention report: "The WWC reviewed 305 studies on Fast ForWord® for adolescent learners. Two of these studies meet WWC evidence standards; six studies meet WWC evidence standards with reservations; the remaining 297 studies do not meet either WWC evidence standards or eligibility screens. Based on the eight studies, the WWC found no discernible effects in the alphabetics and general literacy achievement domains, and potentially positive effects in the reading fluency and comprehension domains for adolescent learners. The conclusions presented in this report may change as new research emerges."

4. Cheung, A., Slavin, R.E. (2011, July). The Effectiveness of Educational Technology Applications for Enhancing Mathematics Achievement in K-12 Classrooms: A Meta-

Analysis. Baltimore, MD: Johns Hopkins University, Center for Research and Reform in Education. Retrieved from http://www.bestevidence.org/math/tech/tech_math.htm

Source: Best Evidence Encyclopedia website
Link: http://www.bestevidence.org/math/tech/tech_math.htm
Summary from the website: "A total of 74 qualifying studies, with a total sample size of 56,886 K-12 students, are included in the final analysis. Three major categories of education technology are reviewed:
• Computer-managed learning, which included only Accelerated Math. This program uses computers to assess students' mathematics levels, assign mathematics materials at appropriate levels, score tests on this material, and chart students' progress.
•Comprehensive models, such as Cognitive Tutor and I Can Learn, use computer-assisted instruction along with non-computer activities as the students' core approach to mathematics.
•Supplemental CAI technology, which consists of individualized computer-assisted instruction (CAI). Supplemental CAI programs, such as Jostens, PLATO, Larson Pre-Algebra, and SRA Drill and Practice, provide additional instruction at students' assessed levels of need to supplement traditional classroom instruction.

Findings of the review indicate that educational technology applications produce a positive but small effect (ES=+0.16) on mathematics achievement. In particular, supplemental CAI had the largest effect, with an effect size of +0.19. The other two categories, computer-managed learning and comprehensive models, had a much smaller effect size, +0.09 and +0.06, respectively."

5. Cheung, A., Slavin, R.E. (2012, April). *The Effectiveness of Educational Technology Applications for Enhancing Reading Achievement in K-12 Classrooms: A Meta-Analysis.* Baltimore, MD: Johns Hopkins University, Center for Research and Reform in Education. Retrieved from http://www.bestevidence.org/reading/tech/tech_K_12_read.html

   Source: Best Evidence Encyclopedia website
   Link: http://www.bestevidence.org/reading/tech/tech_K_12_read.html
   Summary from the abstract: "The purpose of this review is to learn from rigorous evaluations of alternative technology applications how features of using technology programs and characteristics of their evaluations affect reading outcomes for students in grades K-12. The review applies consistent inclusion standards to focus on studies that met high methodological standards. A total of 84 qualifying studies based on over 60,000 K-12 participants were included in the final analysis. Consistent with previous reviews of similar focus, the findings suggest that educational technology applications generally produced a positive, though small, effect (ES=+0.16) in comparison to traditional

methods. There were differential impacts of various types of educational technology applications. In particular, the types of supplementary computer-assisted instruction programs that have dominated the classroom use of educational technology in the past few decades were not found to produce educationally meaningful effects in reading for K-12 students (ES=+0.11), and the higher the methodological quality of the studies, the lower the effect size. In contrast, innovative technology applications and integrated literacy interventions with the support of extensive professional development showed more promising evidence. Although many more rigorous, especially randomized, studies of newer applications are needed, what unifies the methods found in this review to have great promise is the use of technologies in close connection with teachers' efforts."

Description of Apple Technology Tools

6. O'Connell, T., Freed, G. & Rothberg, M. (2010). Using apple technology to support learning for students with sensory and learning disabilities. WGBH Educational Foundation. Retrieved from: http://images.apple.com/education/docs/L419373A-US_L419373A_AppleTechDisabilities.pdf

   Source: Apple in Education website
   Link: http://images.apple.com/education/docs/L419373A-US_L419373A_AppleTechDisabilities.pdf
   Summary from the introduction: "This white paper provides an overview of educational technology policy and practice with concrete examples of how teachers, students, and parents can use Apple technology to make a difference for students with sensory and learning disabilities."

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