

## Rethinking Remediation in Higher Education: The Role of Cognitive Skills

### The Current Remediation Situation

The remediation statistics are sobering. Over half of students who enroll in 2-year colleges take remedial courses in English and/or math. Almost 20% of those enrolling in 4-year colleges do so. The rates for low-income students are even higher – 68% and 39% respectively.<sup>1</sup>

Of even greater concern is that higher education's remediation efforts don't seem to be working. Of those enrolled in remedial courses in a 2-year college, 62% complete remediation, but less than 10% graduate within 3 years. For students taking remedial courses in 4-year colleges, almost 75% complete remediation, but only 35% graduate within 6 years. It has been reported that students who are recommended for remediation, but don't take it, do as well in entry-level college courses as students who completed the remediation.<sup>2</sup> It doesn't seem that remedial courses in college are delivering the skills required for post-secondary academic success.

The issue of remedial support in higher education were highlighted in 2012 because of the changes the National Collegiate Athletic Association (NCAA) made to the requirements for athlete eligibility for college athletic scholarships and to maintain eligibility to play their sport once enrolled. When the NCAA raised the minimum GPA for high school students to receive a college scholarship from 2.0 to 2.3, it meant that many students who were eligible under the old standard would not have met the new requirement. The percentage for football was 35% and for basketball, 43%.<sup>3</sup>

The problem, it is widely agreed, is that many students graduate from high school but are not ready for college work. This does not mean that they have not taken the coursework that was supposed to prepare them. After all, most colleges require the completion of a certain number and type of high school courses (e.g., four years of English). The NCAA, specifically, has specific course requirements for eligibility for an athletic scholarship.

If they have taken the coursework, but still aren't ready, that might suggest that there is a disconnect between what students are supposed to learn in high school and what they need to know to be ready for college. But there is considerable information that implies that the truth is that too many students have not reached the levels of performance that would be consistent with high school completion. For example, one learning specialist at the University of North Carolina tracked data and found that 60% of athletes who played football or basketball from 2004 to 2012 read between the fourth- and eighth-grade levels. Between 8% and 10% read below a third-grade level.<sup>4</sup>

Thus, the need for remediation seems real, but the traditional approach does not seem to be helping students succeed in college. Traditional remediation courses in college look a lot like the same courses did in high school. As Complete College America pointed out in a recent report, "College students come to campus for college, not more high school." When students spend too long in remedial courses, they lose momentum and hope, which certainly contributes to the lack of persistence to a degree or even to entry-level courses.

And there is another critical question that must be asked. If the approach to educating students in the prerequisite skills in college is the same as in high school, and the approach failed when these students were in high school, why would we expect a different outcome? Perhaps the lack of positive outcomes

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1. "Remediation: Higher Education's Bridge to Nowhere," Complete College America, 2014

2. Ibid.

3. [www.ncaa.org](http://www.ncaa.org)

4. "Some college athletes play like adults, read like 5th graders," CNN, Sara Ganim, January 8, 2014

should not be surprising. Perhaps the question that should be asked is, “What was missing in students’ prior education that needs to be changed when those students get to their college campus?”

The office of the State Superintendent in Washington DC provides the following definition of what College Readiness requires:

*“A College Ready student is an academically prepared student, ready for postsecondary education or training without the need for remedial coursework. Whether you are pursuing a four-year degree or studying for a skilled trade license, being ready means having the reading, writing, mathematics, social, and cognitive skills to qualify for and succeed in the academic program of your choice.*

*Ultimately, college and career readiness demands students know more than just content, but demonstrate that they know how to learn and build upon that content to solve problems. They must develop versatile communication skills, work collaboratively and work competitively in a school or work environment.”<sup>5</sup>*

This definition clarifies that being ready for post-secondary work is not simply a matter of having passed the required courses, or reading at a sufficient level, or knowing algebra. It is also a matter of “non-academic” skills like communication and collaboration, as well as the level of a student’s cognitive development. In fact, cognitive development is not a requirement for high school graduation nor is it measured as a prerequisite to college admissions, but it is nonetheless critical for success. And the lack of fully developed cognitive skills may, in fact, be the root cause of many students’ lack of achievement in reading and math. As the Organization for Economic Cooperation and Development pointed out in a recent report, “The evidence points to differences in cognitive skills as an explanation of a majority of the differences in economic growth rates across OECD countries.”<sup>6</sup>

### **The Case for Cognitive Skills Development in Remediation**

In fact cognitive skills are more than just a complement to academic skills. They are foundational, and in many respects, they are precursors to educational success and the learning process itself. In the last several years, an awareness of the connection between cognitive skills and educational success has grown, and research is showing that cognitive abilities contribute to academic achievement.<sup>7,8</sup> Many researchers have illustrated how brain development can impact school readiness and achievement, including cognitive control, visual-spatial skills, planning, attention, simultaneous and successive processing and a variety of other cognitive processes.<sup>9,10</sup> As a result of these and other research efforts, educational and developmental psychology researchers are starting to see the need to find ways to add training of cognitive skills to the education system.<sup>11</sup>

While the principles of cognitive skill training have been developing over several decades, only recently has there emerged a practical and scalable approach to the development of cognitive skills that can rapidly improve cognitive capacity and a student’s potential for success. The effectiveness of cognitive skills training in a video-game format was shown in research published in 2007 with a software program

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5. <http://osse.dc.gov/service/what-does-college-and-career-readiness-mean>

6. “The High Cost of Low Educational Performance,” OECD, 2010

7. Pickering, S.J (Ed.). (2006). Working Memory and Education. Burlington, MA: Academic Press.

8. Naglieri, J.A., & Das, J.P (2005) Planning, Attention, Simultaneous, Successive (PASS) theory: A Revision of the Concept of Intelligence. In D. Flanagan, & P. Harrison (Eds.) Contemporary Intellectual Assessment: Theories, Tests and Issues. (pp. 120-135) New York: Guilford Press.

9. Noble, K. G., Tottenham, N., & Casey, B.J. (2005). Neuroscience Perspectives on Disparities in School Readiness. *The Future of Children*, 15(1), 71+.

10. Noble, K. G., McCandliss, B. D., & Farah, M. J. (2007) Socioeconomic gradients predict individual differences in neurocognitive abilities. *Developmental Science*, 10(4), 464-480.

11. Uttal, D. H., Meadow, N. G., Tipton, E., Hand, L. L., Alden, A. R., Warren, C., & Newcombe, N.S. (2012, June 4). The Malleability of Spatial Skills: A Meta-Analysis of Training Studies. *Psychological Bulletin*. Advance online publication. doi: 10.1037/a0028446.

called BrainWare SAFARI.<sup>12</sup> Since that initial study, a variety of public, private and charter schools across the U.S. have replicated and extended the findings from the original research. While the initial study and much of the subsequent field research has examined the impact on elementary and middle-grade students, what is known about the plasticity of the brain and the essential principles of cognitive development would suggest that positive results could also be achieved in a college-age population.

There is one particular group of students whose cognitive development is known to be lacking in some respect – students with learning disabilities. Students with learning disabilities perform significantly worse academically at all levels of elementary and secondary education. And when students with learning disabilities enroll in college, their completion rate is lower than the general population.<sup>13</sup>

As in elementary and high school, services for students with learning disabilities focus mostly on accommodations (extra time, help taking notes and the like).<sup>14</sup> Services to remediate deficits in underlying cognitive processes have not typically been offered, at the elementary, secondary or post-secondary levels of education.

Recent research with BrainWare SAFARI, however, demonstrates that services for students with learning disabilities that go beyond traditional interventions and accommodations to help students develop their underlying cognitive skills can dramatically improve their cognitive functioning (on average to the level of students without a learning disability). These dramatic improvements in cognitive functioning have been shown to yield unprecedented increases in academic performance.<sup>15</sup> In addition to enabling greater academic levels of achievement, cognitive skills training also develops the cognitive processes required for problem-solving, planning, effective communication and collaboration, skills that are part and parcel of “college readiness.”

The effect of cognitive skills training is not limited to students with learning disabilities. The positive impact has been shown in a variety of instructional settings, in different parts of the country and with students of widely varying academic ability.<sup>16</sup>

When remediation fails and students drop out of college, the costs are high for individual students, and for society. In 2009, 29% of individuals with student loans dropped out of college. Of those, 25% were subsequently unemployed and between 17 and 30% defaulted on their student loans.<sup>17</sup> Moreover, the average earnings of a college graduate of \$45,500 dramatically exceeds the average of \$28,000 for a high-school graduate.<sup>18</sup>

The potential impact of using the same type of cognitive skills training that has shown such promise at the elementary and middle grade levels in high school and college has only begun to be explored.

In the fall of 2015, BrainWare SAFARI cognitive skills development software was incorporated into a 3-credit-hour Student Success course at Ivy Tech Community College in Muncie, IN. Despite initial challenges in implementation, four of the ten students who completed the Student Success Course that incorporated BrainWare also completed a sufficient number of sessions and levels in BrainWare SAFARI to suggest measurable improvement in cognitive functioning (one did not). Pre- and post-test scores on the GAMA (cognitive test) are available for three of the four. Those three students improved their cognitive performance, increasing their IQ scores by 6, 12 and 21 points respectively, with each experiencing significant gains in one or more subtest areas.<sup>19</sup>

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12. “A Study of the Effectiveness of Cognitive Skill Therapy Delivered in a Video-Game Format” Helms, D. and Sawtelle, S.M., Optometry & Vision Development, Volume 38, Number 1, 2007.

13. “The State of Learning Disabilities: Facts, Trends and Emerging Issues,” National Center for Learning Disabilities, 2014.

14. “Accommodating Colleges Students with Learning Disabilities,” The John William Pope Center for Higher Education Policy, 2010

15. “Effect of Neuroscience-Based Cognitive Skill Training on Growth of Cognitive Deficits Associated with Learning Disabilities ...” Sarah Abitbol Avtzon. Learning Disabilities: A Multidisciplinary Journal. 18 (3), 2012: pp. 111-122.

16. [www.MyBrainware.com/safari/research](http://www.MyBrainware.com/safari/research)

17. “Degreeless in Debt: What Happens to Borrowers Who Drop Out,” Education Sector, 2012

18. “The Rising Cost of Not Going to College,” Pew Research Foundation, 2014

19. <https://mybrainware.com/wp-content/uploads/2017/03/Incorporating-Cognitive-Skills-Training-in-an-Introductory-Community-College-Course-2-29-16.pdf>

The return on investment, if such training is even modestly successful, would be stunning, as illustrated in Appendix A. This conservative analysis suggests that the return on providing a cognitive skills development program to under-prepared college students could easily exceed 480%.

### **Conclusion**

The need for new thinking on the issue of remediation in higher education is evident, based on the numbers of students who are not college-ready when they graduate from high school and the low graduation rates for students who have taken remedial courses. The potential impact of cognitive skills training to address the lack of student preparedness, academically and cognitively, may provide an opportunity for many students to achieve their dreams of a college education and the advantages that entails by giving them the foundation and the capacity for academic success at the post-secondary level.

Appendix A

Analysis of Return on Investment in Cognitive Skills Training on College Remediation

Number of students taking remedial college courses annually:	1.7 million
Annual expenditures on remedial courses:	\$3 billion
Average cost of remedial courses per student:	\$1,765
Graduation rate for students in remedial courses	35% for 4-year colleges 10% for 2-year colleges
Estimated cost of computer-based cognitive skills training per student	\$100
If the reduction in need for academic remediation is 10, savings would be	\$300,000,000
If the improvement in graduation rates is 10%, rates would rise to	38.5% for 4-year colleges 10.1% for 2-year colleges
Investment	\$170,000,000
Reduction in expenditures on remedial courses	\$300,000,000
Increased earnings for 2-year college graduates (10 to 11% rate)	\$1.7 million annually
Increased earnings for 4-year college graduates (35 to 38.5% rate)	\$520 million annually
Return on Investment*	480%

\*This analysis does not account for working lifetime value of incremental earnings, the amount of savings from non-defaulted student loans, savings from unemployment benefits, lowered rates of justice system issues, and the like.