

# 3

## ***Rewards and Learning***

Research cited in the previous two chapters showed how well-designed reward systems work in a wide range of circumstances to encourage desirable behavior. This chapter reviews research on the effects of rewards on learning in K–12 educational settings. Further evidence will be presented in Part 2 when effective practices are reported and in Part 3 when promising new programs are described.

It is important to acknowledge at the start what the data do not prove. Aristotle elevated beauty above pleasure and material advantage, but any one of these may motivate people to a greater or lesser extent. Some students may be highly motivated to gain knowledge for its own sake while others may be motivated more by the prospects of pleasure or material advantage. Similarly, students in any given class or grade may vary greatly in their responsiveness to immediate and deferred rewards. For example, in Japan students try hard not to let down their small work groups (*han*) within their classes. Awareness of such individual and cultural variations, and using rewards that take them into account, can make incentives more effective.

### **High-Stakes Exit Exams**

John H. Bishop, a professor of human resource studies at Cornell University, has devoted much of his career to studying the effects of high-stakes exit exams on student achievement.<sup>1</sup> He thinks one reason American high-school students don't perform as well as students in other countries is "that they devote less time and intellectual energy to their

schooling. Learning takes work, and that work is generally not going to be as much fun as hanging out with friends or playing Grand Theft Auto.”<sup>2</sup> Exams with real consequences for college admission and other rewards can cause students to perceive that hard work is worthwhile.

Other countries reward students who score well on high-stakes exams prior to high-school graduation with admission to elite universities and desirable academic programs (such as engineering and pre-medicine). Bishop’s research shows the incentives created by such exams raise achievement by 1.3 grade levels in science and 1.0 grade level in math compared to students in other equally developed countries.<sup>3</sup>

Bishop’s research also shows U.S. students living in states requiring them to pass tests before getting a high-school diploma learned more mathematics and science than students who did not.<sup>4</sup> These students were more likely to complete homework, talk with their parents about schoolwork, and watch less television than their peers, all good habits necessary for high achievement. However, such laws, which existed in 17 states in 2004, test only for basic skills and establish a minimum level of academic competence for graduates rather than act as a reward for advanced achievement.

More promising are what Bishop calls “curriculum-based external exit examinations” such as those administered in Canada and other countries and in New York State, North Carolina, and Michigan. These countries and states reward students who score high on more-rigorous exams. “Colleges consider [New York’s] Regents diploma a mark of significant achievement,” writes Bishop, “making it worth students’ while to learn the tested subjects. The Regents exams give students a lofty goal to aspire to, rather than a low hurdle to jump over.”<sup>5</sup> Passing the Regents exams is also financially rewarding since high scorers gain free tuition to New York State universities.

Bishop’s research on student achievement in several countries shows curriculum-based external exit exams have positive effects on college enrollment, job success, and scores on international achievement tests.<sup>6</sup> They also provide better measures of students’ achievement levels than minimum competency tests.

Bishop stresses that not all tests are equal. The ACT and SAT “are not comprehensive measures of a well-rounded secondary education. Both of these admissions tests fail to assess most of the material – economics, civics, literature, foreign languages, and the ability to write an essay – that

high-school students are expected to learn. The energy that students devote to cracking the narrow SAT-1 and the ACT would be better spent reading widely and learning to write coherently, to think scientifically, to analyze and appreciate great literature, and to converse in a foreign language.”<sup>7</sup>

### **Paying Students for Test Results**

Hundreds of published, well-designed studies, complete with comparison groups, show the benefits of attaching rewards to performance on a wide variety of tests, including frequent low-stakes tests.<sup>8</sup> For example, in 2012, Steven D. Levitt, John A. List, Susanne Neckermann, and Sally Sadoff reported the results of experiments involving more than 7,000 students in three low-performing school districts in and around Chicago.<sup>9</sup> They summarized their findings as follows:

First, we find substantial incentive effects from both financial and non-financial incentives on test scores. Second, we find that non-financial incentives are considerably more cost-effective than financial incentives for younger students, but were less effective with older students. Third, and perhaps most importantly, consistent with hyperbolic discounting, all motivating power of the incentives vanishes when rewards are handed out with a delay.

Levitt and others’ findings confirm insights offered in the previous chapters and that will appear later when we describe reward systems currently working in elementary and secondary schools. For example, financial rewards work better for older students who are “wealthier” than younger students and better understand that money can be used to obtain highly valued things. Rewards should be given as soon as possible to reinforce proper behavior by children who do not yet fully recognize the benefits of delaying gratification.

Small and frequent rewards can keep students motivated to pursue levels of academic achievement that will pay off only much later in life during college or in the workforce. Interestingly, Levitt *et al.* did “not see an increased response of effort when rewards are framed as losses,” suggesting the aversion to losses that Tversky and Kahneman first observed in their college students does not apply to younger students or disappears when a larger sample size is used to test the theory.

Paying students for high performance on exit examinations required for

graduation can serve as inducements to higher achievement. A program launched in 1999 in Michigan offers one-year college scholarships of up to \$2,500 for students scoring high on the Michigan Educational Achievement Program (MEAP) tests in reading, mathematics, science, and writing. Students in the seventh and eighth grades can receive up to \$500 more if they meet or exceed state standards on two of the four MEAP exams. Participation in the MEAP tests rose from 75 percent of seniors in 1999 to 99.7 percent in 2002, average scores rose significantly, and Michigan's scores on the combined verbal and mathematics tests on the SAT-1 rose 5 percent more than for the rest of the country.<sup>10</sup>

Two programs in Israel that reward schools and their teachers with money and additional conventional resources for helping students pass high-school matriculation exams produced "significant gains in many dimensions of students' outcomes. Endowing schools with more resources also led to improvements in student performance. However, the comparison based on cost equivalency suggests that the teachers' incentive intervention is much more cost effective."<sup>11</sup>

More evidence of the effectiveness of financial rewards can be found in Texas, where the O'Donnell Foundation's Advanced Placement Incentive Program offered rewards to students to encourage them to take Advanced Placement (AP) exams and rewards to teachers to encourage them to help the students prepare.<sup>12</sup> AP exams are national tests that provide external, objective, and rigorous standards for high-school students. More than half-a-million high-school students take AP exams on the content of more than 25 college-level courses. More than 2,500 colleges grant course credit for passing grades, allowing students to graduate early or take more advanced college courses.

Beginning with the 1990–91 school year, the O'Donnell Foundation incentive program paid students \$100 for each passing score on an AP exam in English, calculus, statistics, computer science, biology, chemistry, and physics, plus a reimbursement for the cost of taking the exam. The program also provided a \$2,500 stipend to each teacher undergoing training to teach advanced courses in those subjects. The teachers also received \$100 for each passing AP examination score of their students.<sup>13</sup>

In the nine participating Dallas schools, the numbers of boys and girls of all major ethnic groups who passed AP exams rose sharply. The number rose more than 12-fold, from 41 the year before the program began to 521 when the study ended in 1994–95. Those who passed AP courses had a

better chance for merit scholarships and entry into selective colleges. Though these numbers speak for themselves, interviews with students, teachers, and college admission officers also revealed high regard for the incentive program. They felt even students who failed AP exams learned better study habits and recognized the importance of hard work for meeting high standards.<sup>14</sup>

Another study, by Lisa Barrow of the Federal Reserve Bank of Chicago and Cecilia E. Rouse of Princeton University, involved 5,161 high-school seniors in California who participated in a field experiment in 2009–10.<sup>15</sup> Approximately half were randomly assigned to a program-eligible group and offered scholarships worth up to \$1,300 each semester for two semesters provided they registered for at least six credits and received a final grade of “C” or better. Eligible students were 5.2 percentage points more likely than the control group to enroll or stay enrolled in college, improved their “learning strategies and academic self-efficacy,” and “reported studying about 9 minutes more per day than those in the control group, were 7.3 percentage points more likely to have been prepared for class in the last 7 days, and were 6.7 percentage points more likely to report attending all or most of their classes in the last 7 days.”<sup>16</sup> The authors also report the students who were offered incentives “were significantly more likely to report behavior consistent with increased internal motivation. In other words, the incentive programs did not seem to reduce their internal motivation.”<sup>17</sup>

### **Paying Students for Inputs**

Michael Sandel, a professor of government at Harvard University, echoed the assertions of many other critics of rewards when he cautioned, “if we pay kids to read books, do we simply add an additional incentive to whatever motivations may already exist? Or, do we teach them that reading is a chore, and so run the risk of corrupting or crowding out the intrinsic love of learning?”<sup>18</sup> One of Sandel’s colleagues at Harvard, economist Roland G. Fryer, Jr., has done much more than speculate about the effect of rewards on students. He and his colleagues at EdLabs conducted a series of multi-city programs involving cash incentives and found “well-designed financial incentive programs are just as effective as other successful education reforms of the past three decades at a fraction of the cost.”<sup>19</sup> In an April 2010 paper for the National Bureau of Economic Research, Fryer explained the incentive program experiments: “In the 2007–2008 and

2008–2009 school years, we conducted incentive experiments in public schools in Chicago, Dallas, New York City, and Washington, DC – four prototypically low performing urban school districts – distributing a total of \$6.3 million to roughly 38,000 students in 261 schools. ... The key features of each experiment consisted of monetary payments to students ... for performance in school according to a simple incentive scheme.”<sup>20</sup> They tested a wide range of scenarios. For instance, some students received \$2 for every book they read; others received \$5 for taking a quiz; middle-schoolers could earn \$50 if they achieved a perfect score.

Fryer found not every “payoff” was actually rewarding, reinforcing, or apparently worth the effort. An article describing Fryer’s work explained, “Most of the students didn’t have a clear idea of what to do to ‘improve their grades.’ Paying students to do things they could control – hand in their homework, read, dress better – did indeed bolster those activities.”<sup>21</sup>

Fryer’s finding that rewards work best for inputs rather than outputs may seem to partly contradict the favorable results of the O’Donnell Foundation AP program, which rewarded students only for their outputs. However, the outputs Fryer studied were a mixture of intermediate accomplishments and subjective grades rather than actual achievement tests. The O’Donnell Foundation program offered well-defined goals and rewards. Like Bishop’s findings reported earlier, the O’Donnell Foundation program shows how well-designed reward programs involving rewards for passing tests can accelerate learning.

### **NRC Report on Incentives**

Some of the findings described above seem at odds with a report on incentives and test-based accountability released by the National Research Council in 2011.<sup>22</sup> More than a few of that report’s findings are couched in language that seems designed to minimize or obscure the positive role tests and rewards play in education. It is hardly the final word on the subject, but some of the report’s conclusions warrant comment.

The report recognizes paying teachers based on the academic achievements of students changes teacher behavior but warns doing so “can produce dramatically different incentives” depending on what indicators of student achievement are used. For example, a teacher would allocate his or her time differently depending on whether the indicator is average test scores, the test score gains for all students in a class, or the test score gains only for the low-achievers.<sup>23</sup> This is certainly supported by the research we

cite and points to the importance of carefully designing such programs. We will discuss this at some length in Chapter 8.

More controversial is this NRC conclusion: “Test-based incentive programs, as designed and implemented in the programs that have been carefully studied, have not increased student achievement enough to bring the United States close to the levels of the highest achieving countries. When evaluated using relevant low-stakes tests, which are less likely to be inflated by the incentives themselves, the overall effects on achievement tend to be small and are effectively zero for a number of programs. Even when evaluated using the tests attached to the incentives, a number of programs show only small effects.”<sup>24</sup>

The first sentence sets an impossibly high, short-term standard for judging the success or failure of rewards based on high-stakes tests, the kind studied by Bishop, and is silent on programs such as the O’Donnell Foundation program that reward students who pass AP exams and their teachers. Those incentive programs demonstrated significant improvements in learning in one city, which hardly suffices to erase the big difference between the U.S. and other nations unless widely implemented.

The NRC’s observations on rewards tied to low-stakes tests refer twice to results for “a number of programs” but are silent on whether there are successful programs in this arena. In fact there are many, as we will show in the longer discussion of tests with rewards in Chapter 8. Later in its report, the NRC acknowledges this when it says, “The key to using rewards in the classroom is to do so in a way that fosters autonomous motivation. As discussed above, autonomous motivation involves engaging students in a learning activity by helping them identify with and fully accept its importance for their own personal goals and values, even though the activity is not inherently interesting to them (at least initially) and therefore not internally motivating.”<sup>25</sup> This comports with our earlier discussion of how rewards can help motivate students to repeatedly practice new skills, such as letter recognition in the case of learning to read, to the point of automaticity so they can master increasingly advanced skills.

### **Superior Results of School Competition**

Studies have shown how increasing competition and consumer choice have reliably increased the quality and lowered the cost or price of a wide range of services including airlines, banks, bus service, debt collection, electric utilities, hospitals, insurance, railroads, savings and loans, utilities, and

weather forecasting.<sup>26</sup> Governments have successfully “privatized” (transferred responsibility for delivering a service from the public sector to the private sector) a long list of formerly government-operated enterprises including hospitals, low-income housing, police and fire protection services, and public pension funds.<sup>27</sup> Many authors have written about how the lessons learned in these other areas can be applied to public K–12 education.<sup>28</sup>

Economists and political scientists have found inefficiency and bureaucracy are natural consequences of systems that aren’t exposed to competition and consumer choice.<sup>29</sup> Bureaucracies are clumsy, expensive, and often ineffective substitutes for market processes that otherwise reward responsible innovation and punish failure, inefficiency, and laziness. Such inefficiency in public education has been amply documented.<sup>30</sup> A pioneering study by John E. Chubb and Terry M. Moe published by the Brookings Institution in 1990 sought to isolate the role of government operation of K–12 schools in causing this inefficiency.<sup>31</sup> Using a database of more than 20,000 students, teachers, and principals in 500 public and private schools, the authors showed a student’s ability (initial student achievement) has the largest influence on the student’s subsequent achievement, but “not far behind it in importance are two factors roughly equal in magnitude, the organization of the school and the family background of the student. ... All things being equal, then, it appears that students can really gain a great deal from attending an effectively organized school.”<sup>32</sup>

Chubb and Moe found private schools were more likely than public schools to be effectively organized. They tend to have clearer and more academically ambitious goals, principals who are empowered to be educational leaders, coursework that is more academically rigorous, and classrooms that are more orderly and less bureaucratic. “Low performance schools,” they wrote, “look less like professional teams and more like bureaucratic agencies.”<sup>33</sup>

Public schools, according to Chubb and Moe, are poorly organized public-sector entities subject to interference from and accountable to elected bodies, what they call “democratic control.” In a remarkably blunt summary of their findings, Chubb and Moe wrote:

The way to get schools with effective organizations is not to insist that democratic institutions should do what they are incapable of



doing. Nor is it to assume that the better public schools, the lucky ones with nice environments, can serve as organizational models for the rest. Their luck is not transferable. The way to get effective schools, rather, is to recognize that the problem of ineffective performance is really a deep-seated institutional problem that arises from the most fundamental properties of democratic control.<sup>34</sup>

The alternative to democratic control is competition and choice: requiring that schools compete among themselves for students and tuition while allowing parents to select the schools they believe are best for their children. Competition rewards school administrators and teachers who work together to produce high-quality outcomes without wasting resources. Unlike monopolies, competitive markets allow producers to specialize and differentiate their products and services, giving consumers more options and choices that are likely to satisfy their wants.

While competition and choice in public K–12 education is highly constrained, enough exists to allow scholars to estimate their effects on student achievement and other outcomes. That research generally compares outcomes of traditional public schools with four kinds of schools exposed to competition: private schools, charter schools, schools participating in public voucher programs, and public schools that compete with one another due to small district sizes or open enrollment policies. Researchers have focused on changes in five measurable outputs of schools attributable to the incentives created by competition and choice. The five outputs are:

- point-in-time academic achievement, meaning the academic standing of students (such as test scores, graduation rate, and college enrollment after graduation) attending schools of choice versus traditional public schools, usually using statistical methods to control for differences in students' socioeconomic status;
- value-added over-time achievement gains, which controls for possible selection bias by taking into account a student's level of achievement *before* attending a school of choice and measuring only the increase (or decrease) attributable to the school;
- cost efficiency, typically annual spending per student, an estimate that is sometimes complicated by differences between tuition and actual

spending for private schools and per-pupil spending by public schools reported by teachers unions versus more inclusive measures reported by independent researchers;<sup>35</sup>

- parental satisfaction or citizens' favorable regard, as revealed by surveys of parents and the general public; and
- social integration or citizenship, as revealed by the diversity of student bodies, surveys of students asking how frequently they interact with students of different ethnicities, scores on civics exams, and levels of student participation in voluntary civic activities.

A comprehensive survey of research on these effects of school choice conducted in 2007 found near-consensus support for the proposition that school choice has positive effects on students attending all four types of schools and for all five types of outcomes under investigation.<sup>36</sup> A table summarizing the research appears below.

As shown by the table, the evidence is conclusive for 14 of the 20 findings and suggestive-but-not-conclusive for the remaining six. Given the uncertainties inherent in social science research, this is dramatic and compelling evidence that competition among schools benefits students, satisfies parents and citizens, and improves efficiency.

<b>Survey of the Evidence for Positive School Choice Effects</b>					
<b>Form of Choice</b>	<b>Point-in-time academic achievement</b>	<b>Value-added-over-time achievement gains</b>	<b>Cost efficiency</b>	<b>Parental satisfaction, citizens' favorable regard, or both</b>	<b>Social integration, citizenship, or both</b>
Charter schools	Conclusive	Conclusive	Conclusive	Conclusive	Suggestive
Vouchers	Conclusive	Conclusive	Conclusive	Conclusive	Suggestive
Private schools	Conclusive	Suggestive	Conclusive	Conclusive	Conclusive
Competition	Conclusive	Suggestive	Suggestive	Conclusive	Suggestive
<i>Source:</i> Herbert Walberg, <i>School Choice: The Findings</i> (Washington, DC: Cato Institute, 2007), Table 7-1, p. 108.					

**Conclusion**

The use of rewards to motivate students to learn has been studied extensively. Contrary to the views of some prominent skeptics, the effectiveness of rewards has been amply demonstrated. Successful programs reward students for doing well on optional high-stakes and mandatory exit exams, for enrolling in AP courses and passing the exams, and for inputs such as reading books, coming to class on time, and turning in homework.

Not every reward program works. Wise educators (and parents) know the effectiveness of rewards depends on the learner, the situation, and the design of the reward system. Rewards appropriate for young children may not be appropriate for older students; rewards for accomplishments that seem out of reach or that arrive months or years later are likely to fail; and reward systems that don't align with or respect the student's own interests, knowledge, and needs are unlikely to work.

Research shows how the absence of rewards built into the current organization of public K–12 schools makes it more difficult for conventional schools to organize for success and perform well. Schools that are insulated from competition can afford to operate “like bureaucratic agencies.” Incentives matter for teachers and administrators, too.

The good news is that many years of experience and hundreds of articles in scholarly journals can help parents, educators, and policymakers design reward systems that achieve their objectives. The research in this chapter, combined with the previous two describing the underlying psychological and economic theories and evidence, makes a compelling case for increasing the use of well-designed rewards in schools.

## Notes

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