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Early, Broadly, and Through Young Adulthood: A Child Development Perspective on Youth Personal Financial Education

Based on remarks made at the Conference on Teaching Economics and Personal Finance: K-12, in St. Paul, Minn., August 10, 2011

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By Richard M. Todd[1]

Abstract: American parents, teachers, and policymakers generally express strong support for personal financial education for high school students, despite a need for further research to determine if such education is effective in improving long-term decision-making capabilities. However, research in related fields such as child development and behavioral economics suggests that personal financial learning begins at an early age and encompasses a broad array of general decision-making skills rather than just narrowly financial topics. This research suggests that educators should take a broad perspective on where and how personal finance is taught and learned and make use of findings in psychology and behavioral economics to enhance instruction. The research also supports the thrust of Minnesota's proposed new social studies standards, which call for personal finance lessons from the early grades through high school but with flexibility on where and how they are taught.

This year's proposed revisions to Minnesota's K-12 social studies standards have highlighted several issues of interest to K-12 educators, including who should teach personal finance.[2] Although we need more research on what works in youth personal financial education, I will draw on research in child development and behavioral economics to argue that children start learning personal finance concepts at an early age. Accordingly, I think that educators should take a broad perspective on where and how personal finance is taught and learned, and I support the thrust of Minnesota's proposed standards, which call for personal finance lessons from the early grades through high school but allow lots of flexibility on

[1] I thank Karen Holden, Joyce Serido, Claudia Parliament, and Jane Stockton for their advice and suggestions but retain responsibility for any errors.

[2] This question is especially pointed at the high school level, where decisions must be made as to the pros and cons of requiring students to take a full semester of personal finance, perhaps taught by a business or consumer science educator, versus other options, such as embedding personal finance lessons within a mathematics or social studies course. Although research does not yet tell us how to fully assess these pros and cons, tight budgets are forcing some school administrators to choose the least cost option for teaching personal finance, rather than what they may see as the most effective option. Budget pressures can also spark tensions among teachers over who gets the personal finance assignments. For now, I see advantages in allowing high schools to try a diversity of approaches to teaching personal finance, including but not limited to the requirement in some districts that graduates must complete a full-semester personal finance course, until we better understand what works for which students.

where and how to do it. My answer to "Who should teach personal finance?" is that lots of us should, but that we also need to draw upon and expand a wide body of research on what works best.

Support for Personal Financial Education in High School Is High

Perhaps partly because of the current high rates of consumer defaults on mortgages and other debts, public support for personal finance education, especially at the high school level, is very high. Eighty-five percent of American parents surveyed this spring said that a course in personal finance should be a requirement for high school graduation.[3] Parents held this view even though, or perhaps because, only 5 percent had learned personal finance from a teacher themselves. K-12 teachers concur with parents. A recent survey of 1,200 K-12 teachers found that 89 percent agreed that "Students should be required to take a financial literacy course or pass a literacy test for high school graduation," including 46 percent who strongly agreed.[4] Finally, government and elected officials' support is evidenced by the fact that almost all states now have some kind of personal financial education guideline or standard, and I would point to the financial literacy work group of the Minnesota legislature's Ladder Out of Poverty Task Force as additional evidence that our elected representatives are interested in personal financial education.

Skeptics and Critics Point to Gaps in Evidence of Effectiveness

I wish that the widespread support for personal finance education was backed up by a solid body of research showing that such education is generally effective. Unfortunately, the research is mixed and

[3] *Practical Money Skills for Life: 2011 Father's Day Survey,* Visa, Inc. Available at practicalmoneyskills.com/resources/pdfs/Visa_FathersDaySurvey_2011.pdf.

[4] However, teachers' support for personal financial education was weaker for middle school and, especially, elementary school. See Wendy Way and Karen Holden, *Teachers' Background and Capacity to Teach Personal Finance: Results of a National Study*, University of Wisconsin, March 2009. Available at nefe.org/LinkClick.aspx?fileticket=q9Ahp7m5Cbg%3d&tabid=246, with related materials at nefe.org/Research/NEFEResearch/GrantStudiesTeachersPreparednessandMoneyMan/tabid/246/Default.aspx.

often disappointing, which has led some experts to argue that personal financial education is a waste of time.

About a year ago, the National Endowment for Financial Education (NEFE) convened researchers from across the country to review 25 years of research within the field. NEFE and most in attendance were strong believers in personal financial education, and the first paper discussed[5] was co-authored by Lewis Mandell, a longtime Jump$tart financial survey evaluator and financial education proponent. Nonetheless, this paper, after surveying most of the available research, concluded that "From a cost-benefit perspective . . . traditional methods of financial education have yet to prove their value" (p. 14). Another attendee, Lauren Willis of Loyola Law School in Los Angeles, went further in a paper called "The Financial Education Fallacy,"[6] wherein she stated (p. 429) ". . . the search for effective financial education continues . . . But it is time to ask whether this enterprise is misguided."

Just when support for personal finance education among parents, teachers, and legislators is running high, why are some prominent academics questioning the whole enterprise? In part, these doubts reflect the general difficulty of social science research. Because it is prohibitively expensive to control for a lot of the relevant variables, such as students' knowledge and prior experience, teachers' knowledge and readiness, and more, much of the research fails to reach clear conclusions. Even skeptics rarely say that we've proved financial education doesn't work; they primarily note our failure to prove it does work.

Doubts also arise because we hold personal finance education to the high standard of changing behavior. In subjects like math, biology, or history, most assessments focus on knowledge, not behavior. We ask whether students have learned history, not whether history classes actually help students avoid repeating

[5] Ray Boshara, John Gannon, Lewis Mandell, John W. R. Phillips, and Steven Sass, *Consumer Trends in the Public, Private, and Nonprofit Sector*, 2010. Available at nefe.org/LinkClick.aspx?fileticket=B4PXjKtMqJQ%3D&tabid=934.
[6] *American Economic Review: Papers and Proceedings 2011*, 101:3, 429–434. Available at aeaweb.org/articles.php?doi=10.1257/aer.101.3.429.

the mistakes of the past. By contrast, in personal finance, we ask not only whether students have learned the material but also whether their learning led them to make better consumer decisions, sometimes many years later. That's appropriate, since better decisions are what we are aiming for, but it's a higher and tougher standard, both to achieve and to prove. Data on the decisions students make in the decades after their K-12 education are very hard to obtain, and linking those decisions back to their K-12 coursework is even harder, given all the other influences in their lives.

With behavioral outcomes in mind, skeptics like Willis further point out that the rapid evolution of financial services leads to rapid depreciation of financial knowledge. Students successfully taught how to use a specific financial product may be unprepared for and prone to make mistakes with new products that come along. Willis is pessimistic not only about our ability to teach people *how* to think about financial decisions but also about the long-term value of teaching them *what* to think. Taken to an extreme, her views imply that education is pointless or even potentially harmful and that very strict regulation of financial products is the best way to ensure sound financial decisions.

Despite the Gaps, a Sense of Optimism

Not all the research is discouraging, especially regarding success in transferring knowledge. Over a decade ago, Sharon Danes of the University of Minnesota and others showed gains in personal finance knowledge, as well as at least short-term concomitant behavioral changes, among U.S. high school students exposed to NEFE's *High School Financial Planning Program*.[7] A recent study, co-authored by Rich MacDonald and Ken Rebeck of St. Cloud State University and the University of Nebraska's William Walstad, found that teachers who were properly trained to teach the *Financing Your Future* curriculum from the Council for Economic Education (CEE) significantly raised the personal financial

[7] Sharon M. Danes, Catherine A. Huddleston-Casas, and Laurie Boyce, "Financial Planning Curriculum for Teens: Impact Evaluation," *Financial Counseling and Planning*, Volume 10(1), 1999, p. 32.

understanding of their students. That is, research shows that students learn personal finance concepts when they have a well-trained teacher using a well-designed curriculum.

As noted above, evidence that knowledge gains lead to more sensible behavior remains less abundant and less clear. Nonetheless, I remain optimistic that research that 1) more carefully measures the quantity and quality of the instruction students receive (including measures of teacher training and effectiveness) and other life experiences that affect the students' behavior and 2) finds practical ways to track students' financial behavior over long time periods will ultimately show that well implemented personal finance instruction leads to better financial decision making. My optimism is partly based on my broad view of personal finance education, which includes the learning of self-control and decision making generally. Below I review evidence that these behaviors influence personal finance decisions and can be shaped by experience and training.

While we wait for clearer research results, I think we can already respond constructively to skeptics' criticisms. For example, we should address the issue that knowledge about the details of a specific financial product can have a short shelf life. Knowing how to balance a checkbook ledger may not be as important as it once was, but the appropriate response is not, in my view, to dump financial education. Rather, it is to embed specific personal finance knowledge within a broader, more enduring framework based on principles of good decision making. Although the specifics of balancing a checkbook may be less important today, the underlying ideas of verifying charges against your account and avoiding overdrafts remain important. Teaching will be more effective if it is based on this higher plane of relatively timeless principles and sound decision making, and if it uses specifics to illustrate principles, not replace them.

Research Shows that Personal Finance Learning Takes Place from K to 12 (and Earlier)

A broader perspective and a focus on sound decision making also allow personal financial pedagogy to incorporate new findings from related fields such as behavioral economics and child development. Teachers' college coursework often includes ideas from child development and psychology. However, personal finance curricula and teachers may have fallen behind the rapid pace of recent research in child development, neuroscience, and behavioral economics. I will draw on findings in these fields to argue for a broad approach, based on the development of good decision-making abilities, in which personal finance capacities and concepts are developed from an early age and across the curriculum. In my view, most teachers can and should contribute to the development of personal financial knowledge and capacity with age-appropriate lessons, including but not limited to specialized instruction in high school. To a significant degree, this view is reflected in Minnesota's proposed new social studies standards.

Key psychological traits like self-control emerge early and affect financial behavior. Sound decision-making capacities, and thus sound personal financial capacities, begin to develop early in life. Work by Art Rolnick and Rob Grunewald of the Federal Reserve Bank of Minneapolis, and many others, links high-quality early experiences to lifetime benefits in both cognitive and noncognitive abilities that are relevant to personal finance.[8]

The development of the human brain begins before birth and proceeds via a complex process influenced by both genetics and experience. An important group of related skills referred to as *executive function* emerges in the first year of life.[9] Executive function includes the skills needed for purposeful, goal-directed behavior, which is critical to personal finance capacity. Its components include the ability to

[8] See material available at minneapolisfed.org/publications_papers/studies/earlychild/index.cfm.
[9] Nathaniel R. Riggs, Laudan B. Jahromi, Rachel P. Razza, Janean E. Dilworth-Bart, and Ulrich Mueller, "Executive Function and the Promotion of Social-Emotional Competence," *Journal of Applied Developmental Psychology*, 27:4, 2006, pp. 300–309.

initiate tasks, inhibit impulses, shift attention from one task to another, and control the content of working memory. Executive function development typically begins early, spurts ahead between the ages of 3 and 7 as the frontal lobes of the brain mature, and continues developing through adolescence and into early adulthood via a "pruning" or "use it or lose it" process involving the frontal lobes. The typical student's ability to absorb good decision-making skills thus progresses rapidly from preschool to second or third grade, well before high school, but continues to expand into the college years.

The development of executive function includes the ability to delay gratification, a skill with clear relevance to personal finance, as illustrated in Walter Mischel's famous marshmallow studies.[10] In the late 1960s, Mischel was studying how the ability to delay gratification changed between ages 4 and 6. He examined children in a preschool that his own daughters attended. Each child was seated at a table that had a single marshmallow placed on it. The child was told that if he or she could wait 15 minutes before eating the marshmallow, a second marshmallow would be provided as a reward. The child was then left alone with the marshmallow. Mischel found that roughly a third of the kids ate the marshmallow immediately, another third tried to wait but gave up before 15 minutes, and the final third successfully delayed and got the second marshmallow. As expected, the ability to wait improved with age. Mischel published a paper to that effect and moved on.

End of story? No. Over the years, Mischel occasionally asked his daughters how their former preschool friends were doing. After several years, he thought he detected a pattern in their reports—the kids who had waited the longest were doing better, behaviorally and academically. Mischel reopened the marshmallow research, and since then he and his colleagues have conducted periodic rigorous assessments of life outcomes for as many of the "marshmallow kids" as possible. They have found strong correlations between the ability to delay gratification at ages 4 to 6 and not only SAT scores but also life

[10] My summary of this work is based on Jonah Lehrer, "Don't: The Secret of Self-Control," *New Yorker*, May 18, 2009.

skills such as delaying gratification at older ages, staying organized under stress, thinking ahead, focusing attention, and using and responding to reason. These skills are all relevant to sound personal financial decision making. Related research[11] on a broader index of self-control shows that toddlers' self-control ratings are significantly correlated with their adult behavior in the areas of physical and mental health (including lower rates of drug addiction), criminal activity, and personal finance, including greater homeownership and savings and fewer credit and bill-paying problems. These correlations held up even controlling for individual IQ and social class; in fact, childhood self-control was a more powerful predictor of adult outcomes than either of these variables. As Mischel says, "If you can deal with . . . emotions, then you can study for the SAT instead of watching television. … And you can save more money for retirement. It's not just about marshmallows."[12]

The ability to delay gratification is influenced by experience, not just genetics. Fetal alcohol exposure, a very early environmental factor, is associated with reduced ability to delay gratification.[13] Development of the brain's frontal lobes, the primary seat of executive function, is impeded when infants and toddlers are reared in stressful environments, and this finding aligns with research showing that stress negatively affects the development of executive function (Riggs et al., pp. 6–7). In short, most of what we know about early childhood development suggests the importance of low stress and positive stimulation for the development of good executive function, including the ability to delay gratification. Because executive function is the foundation for sound decision making, including personal financial decisions, parents and child care providers who create safe but stimulating environments for young children are important but unrecognized financial educators.

[11] Terrie E. Moffitt, Louise Arseneault, Daniel Belsky, Nigel Dickson, Robert J. Hancox, HonaLee Harrington, Renate Houts, Richie Poulton, Brent W. Roberts, Stephen Ross, Malcolm R. Sears, W. Murray Thomson, and Avshalom Casp, "A gradient of childhood self-control predicts health, wealth, and public safety," *Proceedings of the National Academy of Sciences of the United States of America*, 108: 7, February 15, 2011. Available at pnas.org/content/108/7/2693.
[12] Lehrer.
[13] Joseph L. Jacobson and Sandra W. Jacobson, *Effects of Prenatal Alcohol Exposure on Child Development*, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, June 2003. Available at pubs.niaaa.nih.gov/publications/arh26-4/282-286.htm.

Formal educational programs are also among the experiences that can affect self-control. Economists studying interventions such as the Perry High-Scope education program for 3- and 4-year-olds found that self-control and other noncognitive abilities were influenced by favorable early childhood education.[14] As Nobel Prize winning economist James Heckman puts it, "Enriched early intervention programs targeted to disadvantaged children have had their biggest effect on noncognitive skills: motivation, self-control and time preference . . . ."[15] Other researchers argue that even youth with lower executive function and patience "can be helped to make more efficient choices if they are guided through experiences that teach how to manage delayed gratification. For example, if they are taught to take their mind off of the desirable immediate choice . . . or the most desirable attribute of that choice . . . , they have an easier time delaying gratification."[16] In other words, it is possible to teach grade schoolers how to manage their impulses and make more deliberate decisions. This component of good decision making and personal financial education can be developed in many small but important ways across the curriculum in grade school.

Research suggests we should continue teaching self-control techniques and good decision-making processes through high school at least. Wulfert and others have essentially replicated the marshmallow results in adolescents, albeit using monetary rewards instead of marshmallows,[17] and Heckman (see footnote 15) has stressed that noncognitive skills remain malleable, or subject to improvement through effective education and mentoring, into early adulthood. He notes a scientific basis for this finding in the late maturation of the prefrontal cortex, which is a center of these noncognitive skills.

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[14] Art Rolnick and Rob Grunewald, "Early Childhood Development: Economic Development with a High Public Return," *The Region*, Federal Reserve Bank of Minneapolis, December 2003. Available at minneapolisfed.org/publications_papers/studies/earlychild/abc-part2.pdf.

[15] Douglas Clement, "Interview with James Heckman," *The Region*, Federal Reserve Bank of Minneapolis, June 2005. Available at minneapolisfed.org/publications_papers/pub_display.cfm?id=3278.

[16] Page 21 of Laura Scheinholtz, Karen Holden, and Charles Kalish, "Cognitive Development and Children's Understanding of Personal Finance," *Consumer Knowledge and Financial Decisions: Lifespan Perspectives*, Douglas Lamdin (ed), New York: Springer, available October 2011. Hereafter referred to as SHK.

[17] Edelgard Wulfert, Jennifer A. Block, Elizabeth Santa Ana, Monica L. Rodriguez, and Melissa Colsman (2002), "Delay of Gratification: Impulsive Choices and Problem Behaviors in Early and Late Adolescence." *Journal of Personality*, 70:4, August 2002, pp. 533–552.

Specific financial concepts develop from preschool on. University of Wisconsin personal finance expert Karen Holden, working with educational psychologists, "asked whether financial literacy programs have been structured taking into account what is known about cognitive development and capabilities of . . . children" from preschool to about third grade.[18] They concluded that "the literature on children's cognitive development and financial literacy education are not well integrated . . . . Financial literacy programs for younger children typically provide lessons without apparent consideration of the underlying concepts to be taught, the cognitive ability of children to grasp those concepts, the diversity that might exist among young children, and the behavior and timing of later behaviors these activities intend to improve."[19] That is, they argue that we have a significant opportunity to improve our K-12 teaching of personal finance by taking advantage of research on child development. Their survey and one by University of Exeter psychologist Paul Webley[20] summarize pedagogically useful findings about how a typical child's financial understanding develops, including the following:

1. *Young children's understanding of future time is limited*. According to SHK (p. 14), "Not until four years of age do children begin to distinguish between two future events, and this reasoning is only present for special events, such as birthdays or major holidays like Christmas, that are a few months away." Thus, at least through the early years of grade school, lessons about planning and savings might benefit from using special days to represent the future, instead of relatively abstract ideas like "a month from now."

2. *Many young children cannot process more than one size concept at a time*. For example, many five-year-olds think that a coin that is bigger in size is also bigger in value; they can't deal with two

[18] Karen Holden, Charles Kalish, Laura Scheinholtz, Deanna Dietrich, and Beatriz Novak, *Financial Literacy Programs Targeted on Pre-School Children: Development and Evaluation*, Credit Union National Association, 2009, p. 2. Available at cunapfi.org/download/197_CUNA_Report_PHASE_ONE_FINAL_4-29-9.pdf.
[19] SHK, p. 4.
[20] Paul Webley, "Children's understanding of economics," *Children's understanding of society*, M. Barrett and E. Buchanan-Barrow (Eds), Hove: Psychology Press, 2005, p. 43–67.

different scales of "bigness" at once (SHK, p. 12). So a nickel seems more valuable than a dime. In the very early grades, one solution is to be aware of this and use only a single type of coin, so that a greater number of coins corresponds to a greater amount of value. As children mature, a different approach is to deepen their understanding of number and value, by deliberately "exposing children to situations that distinguish between . . . size and amount . . . ." (SHK, p. 12–13) One way or another (SHK, p. 23), "knowing that very young children have a hard time keeping track of number and size at the same time should be incorporated into lessons that aim to teach about money as a means of exchange."

3. *Ideas about value get more sophisticated by middle school*. Webley (p. 48) confirms that 4- or 5-year-olds often equate value with size, so that when asked which costs more, a head of lettuce or a package of chicken, a child of that age may reply, "The lettuce, because there is more of it." By age 7 or 8, value tends to be associated with perceived usefulness, as when a watch is thought to cost more than a book "because you can tell the time with a watch, but a book you can just read." By age 10, value may be linked to labor and materials, as in "Things which people work on more cost more." Although thirteen-year-olds tend to be more sophisticated, recognizing both work put in and customer preferences, more complete supply and demand ideas often come even later. Again, teachers may sometimes decide to stretch students, helping them bridge to a deeper understanding of value, and at other times they may choose to work within their students' limits.

4. *Children's views of money as a medium of exchange typically shift from ritualistic to financial during grade school*. By age 4 or 5, most children are starting to realize that money is required to buy something, but they don't fully grasp that the value or denomination of the money matters. Giving money and getting goods is seen as a ritual, something we just do.

> By age 5-6, children appeared to understand different denominational values, but often, when playing the role of the storekeeper, would give back change because that is 'what storekeepers do.' It is only around age 7 that children begin to follow the logical rules of

> exchange, understanding that money can be exchanged for goods and that change is provided only when denominations are larger than the cost of the item. (SHK, p. 17)

Similarly, allowances may initially be seen simply as a sign of parental approval or an entitlement rather than as a reward for specific work or behavior (SHK, p. 16).

5. *Savings motives change from social to financial in the elementary years*. Up to the early grades, according to SHK (pp. 21–22), "Savings decisions are made in response to a broader set of social concerns, such as: fulfilling parental expectations, being a 'good boy,' or enjoyment of participation in an adult-like behavior. The purely financial meaning of savings is not salient to young children." By contrast, Webley (p. 58) found that "Most 9-year-olds and all 12-year-olds . . . showed a functional understanding of saving. They knew what saving was for and they knew how to do it . . . . For these older children saving is not seen as good per se, but one possible way of achieving a goal."

6. *Ideas about trade and exchange generally also develop significantly between kindergarten and grade six*. Many children in the early grades also perceive barter and trading in social rather than financial terms. Among young children, Webley (p. 60) found swapping to be common but concluded that "Its purpose is not really to acquire a toy, pencil, or sticker but to cement friendships. Younger children are happy to make swaps that are clearly economically a poor deal, but will always have a good reason for doing so, for example, as an overture to friendship." This soon changes; Webley goes on to say that "By approximately age 11, swapping is less popular, but is also conceived of in economic terms: It has turned into the adult act of bartering."

In other words, trade and exchange, which adults readily associate with markets, are in fact first experienced within the family and with friends. These early exchange experiences generally do not cleanly separate rational deal making from ritual, emotional bonding, social obligation, and other "non-market" considerations. Not surprisingly then, young children may focus on one or more non-

market aspects of what adults would typically consider a market exchange. Educators can at times accept this, by including non-market considerations in their lessons. Alternatively, educators can help children's perceptions mature, by exposing them to more adult concepts of when it is appropriate to consider non-market factors.

7. *Understanding of "abstractions" like profit, middlemen, and banks is slow to develop.* Profit is hard for young children to grasp, especially profit from trading as opposed to profit from making things. According to SHK (pp. 18–19),

> Only at around 11 years of age do children understand the concept of profit and its role in willingness to produce and sell goods. Younger children tend to think that items are sold at the same price as they are purchased by the seller. Integration of sale price, production price and profit (or losses) constitutes a major conceptual change in the way children understand market exchanges. Work in this field suggests that children require experiences comparing and contrasting these concepts in order to successfully change their overall concept from disjoint to connected systems of supply price, demand price and profits . . . .

Webley adds (pp. 51–52) that "profit in shops and factories was understood differently. Whilst only 11% of the 11- to 12-year-olds understood profit in shops, 69% mentioned profit as a motive for starting factories. This difference probably results from profit from trading being a harder concept to grasp than profit from making." If further research substantiates this finding, teachers may wish to introduce the concept of profit first with regard to the making of tangible objects and defer until later the concept of profit as it pertains to shopkeepers and other intermediaries.

Understanding of banks develops even more slowly. SHK (p. 20) say that "It is generally thought that a reasonable understanding of the complex institutional nature of banks and credit unions does not emerge until around 10 or 11 years of age . . . ," although this varies, depending on children's exposure to financial institutions. Webley (p. 52) adds that "children's understanding of bank profit develops from no knowledge of interest, to understanding interest on deposits [around age 11], to

believing that deposit interest is higher than loan interest, to believing that the interest is the same [around age 15], to finally recognising that interest is higher on loans and consequently that is how banks make profits."

8. *Positive causal links may be understood before negative causal links*. According to Webley (p. 49), 5-year-olds can correctly answer the following about "Kathy," who has a lemonade stand. "One day it was a holiday and a lot of people were out of town, so not as many people as usual walked down Kathy's street. Do you think Kathy sold more, or the same, or less cups of lemonade than she usually did?" Linking fewer people to fewer sales, with both effects in the same direction, can be understood at an early age. By contrast, negative relationships are understood later, so that 8-year-olds understand the following but 5-year-olds might struggle: "Usually John's lemonade stand was the only one on the block. But one day, both kids who lived next door to John decided to run lemonade stands too. Do you think John sold more, or the same, or less?"' Here we need to link more of one thing—competitors—to less of another—John's sales. The difference from the previous example may seem trivial to adults and thus not be reflected in supply-and-demand lesson planning, but child development research says that, developmentally, the second example is harder.

9. *Overall, the foundation for personal financial learning and behavior is laid in grade school and then built upon by in-depth learning in the later grades*. Although phrased in terms of economics concepts, Webley's examples suggest that his conclusions apply to personal finance as well. He finds (p. 63) that "it is possible to teach many economic concepts to children aged 7–11" and that (p. 62) "children's understanding of economic situations is broadly comparable to that of adults by the time they are 11 or 12. At this age they may need more experience to understand the complexities of particular economic institutions . . . but their understanding of the economic structure of particular settings is essentially adult."

Thus, provided a good foundation for decision making and basic concepts has been laid by eighth grade, high school students should be ready to absorb fairly sophisticated and detailed concepts and information, even though their decision-making skills are not fully mature and some who lag may need remediation. By high school, then, we want to move students from, for example, a general ability to defer gratification to a relatively precise understanding of the time value of money and a somewhat mature ability to weigh future consequences, such as debt payments, against current consumption.

Numerical ability is strongly correlated with financial capability. Recent research, much of it in the spirit of behavioral economics, has documented fairly strong correlations between individuals' numerical skills, or numeracy, and their financial understanding and behavior. So far these results primarily establish a correlation between numeracy and financial capability, without clearly showing a causal relationship. So we don't know, for example, if extra math classes would be more effective than a personal finance class in boosting our students' financial capabilities. Nonetheless, good mathematics teaching in elementary and middle school is clearly an important part of the foundation of financial literacy—or, in short, arithmetic and math teachers are our allies.

For example, Gerardi, Goette, and Meier[21] studied subprime mortgage borrowers. Those with lower numerical ability were significantly more likely to default on their mortgage. This remained true even when the researchers controlled for other factors, including educational attainment, credit score, employment, race/ethnicity, age, family structure, and non-numerical indicators of mental capacity such as verbal ability and memory. Similarly, Agarwal and Mazumder[22] studied members of the U.S. military, which allowed them to relate behavior to results from the Armed Services Vocational Aptitude Battery

[21] Kristopher Gerardi, Lorenz Goette, and Stephan Meier, *Financial Literacy and Subprime Mortgage Delinquency*, Federal Reserve Bank of Atlanta Working Paper 2010-10, April 2010. Available at frbatlanta.org/pubs/wp/working_paper_2010-10.cfm.
[22] Sumit Agarwal and Bhashkar Mazumder, *Cognitive Abilities and Household Financial Decision Making*, April 2010 Symposium: Family Financial Security, Center for Financial Security, University of Wisconsin-Madison. Available at cfs.wisc.edu/Files/Working%20Papers/Agarwal-1.pdf.

(ASVAB). They found that service members were more likely to make simple financial errors if the numerical component of their ASVAB was low. This was not true for scores on the verbal component or other components of the ASVAB. Researchers in Sweden, Australia, and England have found somewhat similar correlations.

Agarwal and Mazumder also found evidence of a correlation between math skills and patience. This is intriguing, and underscores that we don't know why math scores are important or whether teaching more math is a good way to improve financial behavior. Do math skills boost patience, because math helps you understand time and compound interest? Is it the reverse, that patience helps you learn math? Or something else? We need more research on this.

Overall, research in child development and behavioral economics suggests that young people's learning of effective financial behavior starts very early, continues for a long time, and takes places not just within specific personal finance classes but across a broad spectrum of their school and extracurricular experience. Specialized personal finance in high school can serve as a strong capstone to a student's personal finance education, but there's a lot more to it.

With Appropriate Lesson Plans, Personal Financial Education Can Be Stand-Alone or Embedded in Other Subject Areas

If research suggests we should teach personal finance, broadly conceived, from an early age, where does it fit in the preschool to eighth-grade curriculum, and who will do it? The answer, I think, is that pre-high school financial learning can be integrated in other disciplines, including not only social studies but also math, reading, and to some extent, whatever it is that teachers do to encourage responsible, self-regulated behavior.

Within the social sciences, there are many outstanding K-12 lesson plans for specific personal finance topics. The major curriculum providers, including CEE, NEFE, Junior Achievement, and BestPrep, have excellent materials for dedicated personal finance classes or units. In addition, many individual teachers at all grade levels write excellent lesson plans of their own. I know that partly from talking with teachers but also because I help pick the winners of the Thrivent Personal Financial Educator awards for the Minnesota Council on Economic Education (MCEE). Competitions like that not only reward good teachers with cash and recognition but also provide a way for teachers to share their best materials and techniques.

Excellent materials are also available for developing personal finance skills in classes beyond the social sciences, such as in mathematics or language arts. Again, the major curriculum providers have lesson plans for teaching personal finance in mathematics and other disciplines. The MCEE's own Curt Anderson has been working recently with St. Paul schools to develop math lessons for grades three to five that incorporate the concepts of money, decision making, and budgets, a great way to meet both the math and personal finance standards at grades three to five. Minnesota teacher Nancy Krenner and others have provided great models for using children's literature to teach both personal finance and economics while also keeping kids on track in language arts. Finally, even the development of pure math and reading skills provides a critical foundation for personal financial capacity.

We Need Better Measurement of and Research on What Works

As we implement a broad approach to personal finance learning from early ages and on, we should also keep working to learn and use what works best. To get more definitive results on how personal financial education affects consumer behavior, we need to improve both our measures of personal finance outcomes and our research methods. One inexpensive but potentially helpful idea is to include questions with personal finance content in existing math and reading tests. Harvard University's Peter Tufano

recently suggested putting simple personal finance questions into the math portion of the PSAT and SAT, to obtain an annual national measure of how well college-oriented youth understand basic personal finance concepts.[23] I would like to advance a local but more inclusive version of this idea—adding personal finance numeracy questions to Minnesota's and other states' standardized K-12 math tests. At the state level, these tests reach more students that the SAT, and they are conducted in elementary and middle schools as well as high schools. Research suggests that a small number of personal-finance-oriented math questions can be used to create a pretty good barometer of overall financial literacy.[24] A consistent annual measure of how much our students know about basic personal finance concepts could do a lot to maintain support of personal finance teaching as well as help us learn what really works.

In Conclusion

While we work to learn more about how personal finance is best taught and who should teach it, let's embrace an array of sensible approaches and, with open minds, learn from each other. Minnesota's proposed social studies standards are a step forward. They provide a clearer endorsement of personal finance than before, and they recognize the benefits of a full K-to-12 development of the topic. Implementing this earlier and broader approach to personal financial education will challenge teachers and school districts over the next several years. Given the gaps in current research, we don't have a single best method, so it's appropriate for districts to try different approaches, ranging from mandatory personal finance classes, as at Hopkins High School in Hopkins, Minn., to embedding instruction in math or reading and more. Let's welcome, study, and learn from a variety of approaches to personal finance teaching while we also develop and draw upon new partnerships with scholars doing related research in neuroscience, psychology, child development, education, and economics. I am optimistic that, by starting

[23] Peter Tufano, "Leveraging Admissions Tests to Increase Financial Savvy," *Chronicle of Higher Education*, October 20, 2010.
[24] James Banks, Cormac O'Dea, and Zoë Oldfield, "Cognitive Function, Numeracy and Retirement Saving Trajectories," *The Economic Journal*, Royal Economic Society, November 2010.

early, adopting a broad, research-based approach, and continuing with age-appropriate instruction through early adulthood, educators can demonstrate their ability to enhance students' capacity for sound personal financial decision making.