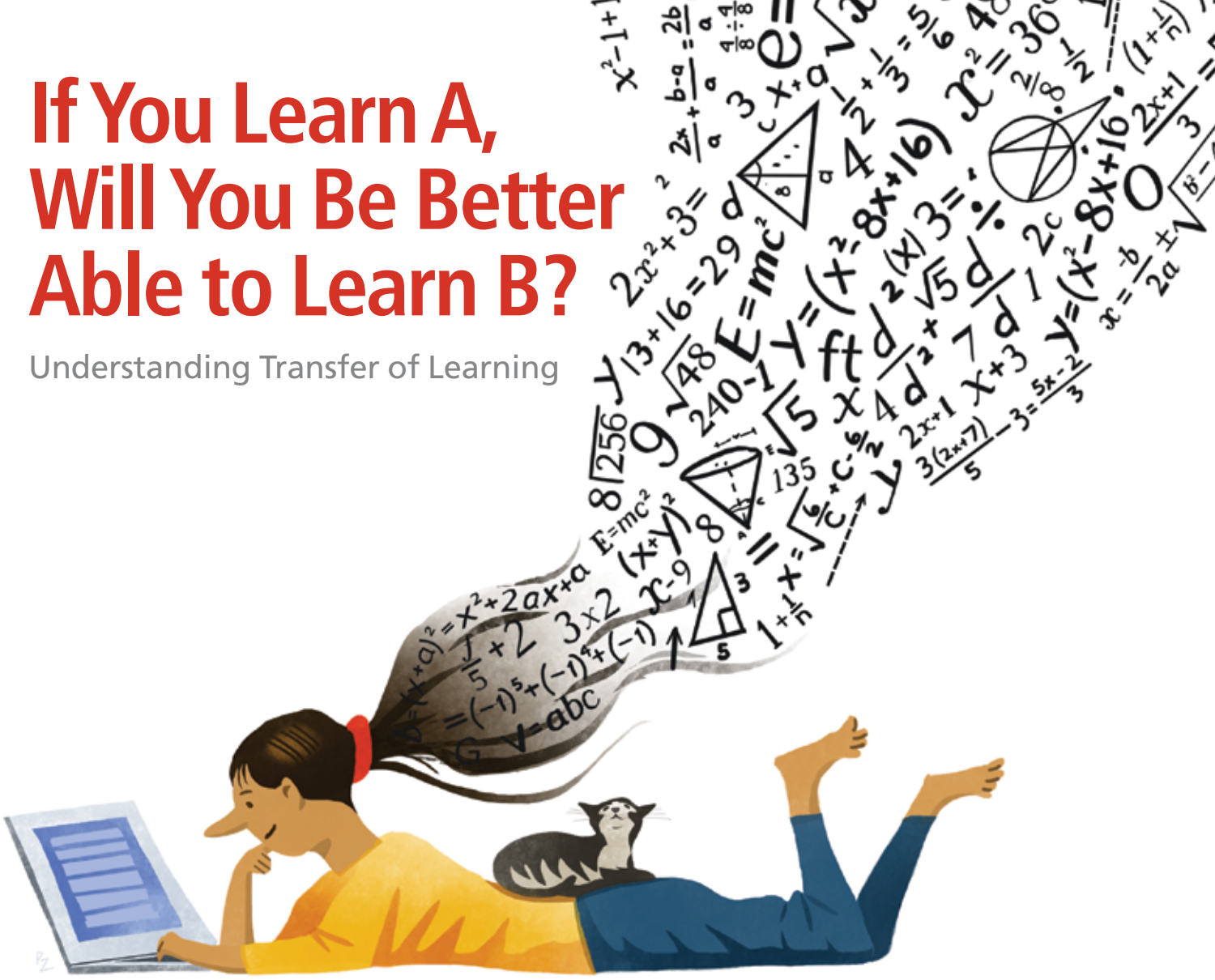
If You Learn A, Will You Be Better Able to Learn B?

Understanding Transfer of Learning



ILLUSTRATIONS BY PAUL ZWOLAK

By Pedro De Bruyckere, Paul A. Kirschner, and Casper Hulshof

In 2015, we published our book *Urban Myths about Learning and Education*.[1] An excerpt of one section of that book, "Technology in Education: What Teachers Should Know," was published in the Spring 2016 issue of *American Educator*. An unexpected effect was that after the book's publication, all three of us received a number of requests per week for new educational fact checks. At first, we blogged or tweeted our short answers to these queries, but at a certain point we decided to bundle the questions and expand upon our answers. This has resulted in a new book with all new "myths," *More Urban Myths about Learning and Education: Challenging Eduquacks, Extraordinary Claims, and Alternative Facts*, from which this article is excerpted. Here, we discuss some of the most often asked questions related to one basic principle in particular: *transfer of learning*.

Transfer of learning is seen as the use of knowledge, skills, and/or attitudes that you've learned in one situation in a different situation.[2] This new situation can be either a similar situation (near transfer) or a dissimilar situation (far transfer). In recent years, we've encountered numerous different forms that claim to be examples of far transfer:

- Learn how to program, so that you can more easily learn mathematics.
- Learn Latin, so that you can better learn other languages.
- Learn music, so that you can better learn arithmetic.
- Learn chess, so that you can better learn to do just about everything!

But are these claims justified? Are they really examples of far transfer?

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Near versus Far Transfer

Imagine that you've learned to drive. You quickly become accustomed to your own car: how the gears work, where to find all the right buttons on the dashboard, etc. If you need to drive a rented car on vacation, some of these things may be different, but your past experience in your own car will soon help you to get the hang of things. It will even help you if you ever need to learn how to drive a bus. This is what we mean by near transfer.[3] Many things from one situation are fairly similar to many things in the new situation, although there may be minor differences here and there.

Far transfer was an idea first examined in 1923 by Edward Thorndike.[4] It was Thorndike, for example, who discussed whether learning Latin could have a positive effect on logical thinking. Even in those days, it was apparent that this was not the case. According to him, it merely seemed that way because so many of the stronger students and thinkers were automatically encouraged to study Latin. In other words, it was more a question of a correlation than a causal relationship. Consequently, the result was the product of something else, namely smarter students or students from a higher social-economic background.

There is, however, another problem with the delineation of near and far transfer. Perhaps you've come across the following situations in your own classroom. During a geography lesson, students learn how to read a map, but then have difficulty in reading a historical map during a history lesson—which, at first glance, you might think should be an example of relatively near transfer. In a comparable way, mathematics is also used during physics lessons, but here the transfer is much easier to accomplish.

To explain such situations, Thorndike formulated his theory of identical elements, which posits that near and far transfer can best be regarded as a continuum. Or to paraphrase his basic conclusion: transfer is easier in relation to the extent that there are more similar or identical elements between what has already been learned and what needs to be learned in the future. Accordingly, he argued that near transfer is, by definition, much easier than far transfer.[5] If we were to take the precepts of this "old" theory at face value, the outlook for the advocates of far transfer might be fairly pessimistic. But is this really the case? Let's take a closer look at a number of examples.

Is Chess the Key to Success at School and in Life?

In 2011, chess became a compulsory subject in Armenian schools. Armenian authorities were convinced that chess is the key to success at school and in life. By making chess mandatory, they hoped to teach children how to think creatively and strategically. As a result, they will become more intelligent and be better able to solve problems. What's more, this does not just mean chess problems, but all problems in all other school subjects, as well as in later life. If true, this is extremely far transfer. There are indeed research studies that demonstrate a link between chess mastery and improved cognitive skills and work performance.[6]

In essence, what the Armenian Ministry of Education was saying is that learning how to play chess not only is the key to developing general skills (in particular, problem solving), but also has a crucial impact on general character traits, such as emotional stability, intellect, memory, alertness, and, above all, creativity.

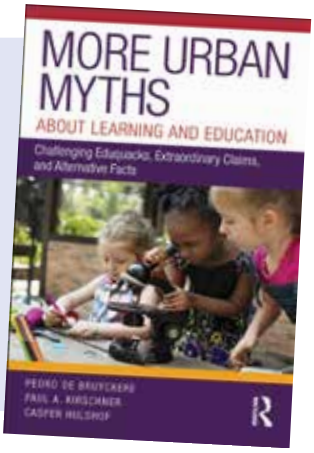
General Character Traits and Creativity

Creativity is not a skill, and it cannot be taught or learned. Creativity is a quality or characteristic that a person possesses. In other words, it's a trait and not a state. Researcher Charles Reigeluth explains it as follows: "Traits are student characteristics that are relatively constant over time, … whereas states are student characteristics that tend to vary during individual learning experiences, such as level of content-specific knowledge."[7] Viewed in these terms, it's not simply that creativity can't be learned; it's also very difficult to influence. All that teachers can do is to provide a learning climate that offers psychological safety—a climate in which learners feel sufficiently secure—so that they have the courage and the confidence to do things and say things that, at first glance, perhaps seem odd or not completely right. In other words, teachers can provide an environment that encourages students to take risks, safe in the knowledge that their mistakes will be tolerated with understanding. We call this psychological safety.

> Transfer of learning is seen as the use of knowledge, skills, and/or attitudes that you've learned in one situation in a different situation.

Memory is also a trait, so it, too, cannot be learned. This does not mean that it cannot be trained or improved, but such training needs to be highly focused and demands a huge investment in time. Consequently, this is not something that can be achieved "*en passant*" simply by learning to play chess.

If we look at this in the context of the Armenian claims about chess and creativity, a chess teacher who provides a psychologically safe climate may indeed be able to teach one or more children how to play chess creatively, but the basic starting point is that the child must possess both the necessary chess knowledge (moves, tactics, strategies) and the necessary chess skills (by using that



knowledge repeatedly in practice games and competitions). This has been known since 1946, when Adriaan de Groot wrote his famous doctoral thesis, *Het denken van den schaker* (*Thought and Choice in Chess*).[8]

In our previous book, we discussed the work of Sir Ken Robinson and formulated a number of reservations about his rather narrow definition of creativity (in his book C*reative Schools: The Grassroots Revolution That's Transforming Education*), but even this narrow definition is applicable in this present context. According to Robinson, creativity is "the process of having original ideas that have value." The key word here is "value."

Without knowledge and skills, it's impossible—except by sheer luck—to create something of value. In fact, if you don't have the requisite knowledge, you are not even in a position to assess the value of what you have done. If you don't know how to play chess, just see how far you get if you are ever asked to develop a creative and valuable solution to a chess problem!

The Effect of Learning to Play Chess on Other Skills

The ability (or otherwise) to change personality traits is still a matter of much discussion, but does chess perhaps have a positive influence on other disciplines and areas of study? This is a subject that has been intensively researched over the years. Some of the resultant studies do indeed suggest a positive effect,[9] whereas others have reached very different conclusions. To help clarify this situation (if we can), it's useful to look at the reviews of the various studies, also bearing in mind the quality of the research methodology used.

One review on the subject of chess and education came with a painful conclusion: "Research in psychology and education suggests that cognitive skills acquired in one domain are not easily transferred to another domain. Do the empirical results of chess research undermine this contention? Unfortunately, the answer is: no."[10] In other words, chess is not an exception to Thorndike's theory of identical elements. A more recent review also found very little real evidence for transfer, although the researchers' final assessment was somewhat milder.[11] They concluded that the test results show that learning to play chess can sometimes have a positive effect on student learning, but this is confined to arithmetic/mathematics in primary and secondary education.

Moreover, this positive effect is only for the short term; there is nothing to suggest more long-term, permanent benefits. And there is more bad news. They further concluded that there is a correlation between the quality of the research design and the level of the effect identified: the better the design, the smaller the effect. In fact, the most rigorous studies found almost no positive effect whatsoever.[12]

Finally, mention should also be made of a large-scale meta-analysis conducted in 2016 that investigated the possible link between intelligence and chess.[13] The conclusion could not be clearer: intelligent players play better chess. This causality follows the same direction that Thorndike established with regard to Latin.

Does Learning How to Program a Computer Encourage Problem-Solving Thinking?

Steve Jobs once said: "Everybody in this country should learn how to program a computer, should learn a computer language, because it teaches you how to think."[14] But was the Apple boss right? You might be excused for initially thinking that this is an area where very little research has been carried out, so that it's difficult to reach firm conclusions. And you would be right—up to a point. After all, it's only recently that a teaching module for programming was introduced in the United Kingdom, and computers like the BBC micro:bit, the Arduino, and the Raspberry Pi are all relatively new in education. That being said, in reality, these developments are merely the latest wave in the process of "programming in education," which actually stretches back over a number of decades and has repeatedly investigated the basic idea that Jobs reformulated. Consider, for example, Logo, the programming language developed for education as long ago as 1967 by Seymour Papert, with its characteristic "turtles." These turtle robots were first invented in the late 1940s by, among others, William Grey Walter,[15] but only became widely known in educational circles thanks to Papert, who used them as a means to promote Logo as a programming language for schools, with the specific aim of stimulating problem-solving capabilities.[16]

Without knowledge and skills, it's impossible—except by sheer luck—to create something of value.

The oldest research into such matters was conducted by Richard Mayer and dates from 1975. His work suggested that learning how to program could have a positive effect on problem-solving thinking, although in reality his study focused more on the best way to effectively teach programming.[17]

In contrast, a series of subsequent studies generally concluded that there is no such positive effect. A 1990 study based on a randomized controlled trial found no link between programming and the ability to solve problems.[18] This was also the conclusion of a comparable study by Mayer.[19] Other research suggested that programming might have a limited beneficial effect on divergent thinking, but this cannot be taken as evidence that it has a major beneficial effect on problem-solving capabilities.[20]

That being said, a review study carried out in 1985 that specifically looked at Logo and its effect on other domains added an important nuance. Just teaching students how to program with Logo had little or no effect. However, if teachers used Logo for specific tasks with a specific purpose, such as mathematics or problem-solving thinking, a "moderate" effect could be achieved. But the input of the teacher was crucial to generate this effect; the programming itself played only a marginal role.[21]

Similar conclusions were reached in a 1990 research project. The researchers found evidence of a clear benefit for problem-solving thinking as a result of learning how to program. Once

again, however, there was an important "but": their research focused on students in further education who all wanted to learn programming. Moreover, there was no control group.[22] Much the same applies to another study that found a positive effect but also concluded that simply teaching students how to program is not enough to generate this effect.[23] The only effective way that the learning of programming can stimulate problem-solving capabilities is for the teacher to give a clear focus on using those skills in a problem-solving context. And once again, there was no control group to compare, for example, the results of attempts to deal with the same problem-solving content without the benefits of programming skills.

It would be possible to carry on like this for quite some time, but we have probably already quoted enough research to make our point: perhaps the problem is not the teaching of programming; the problem is the idea that it's possible to teach students how to think in a problem-solving manner. Or, as researchers concluded in 2010:

> In over a half century, no systematic body of evidence demonstrating the effectiveness of any general problem-solving strategies has emerged. … There is no body of research based on randomized, controlled experiments indicating that such teaching leads to better problem solving.[24]

Does Music Help You Perform Better in School in General?

Since all three of us are music lovers, we need to be wary of possible confirmation bias when it comes to this particular subject: it's sometimes all too easy to search for evidence that confirms what you would like to be true! That being said, a very recent longitudinal study (i.e., a study that follows the same people for a number of years, here also using a randomized design with a control group) gives some grounds for optimism.[25]

More specifically, Artur Jaschke and his colleagues examined the effects of learning how to play music on executive functions, the higher cognitive processes that are necessary to plan and direct activities. Over the duration of the study, the scores periodically given to the intervention group for impulse suppression (inhibition), planning, and verbal intelligence all improved significantly. It's also possible that the improvements in these three qualities helped account for a similar improvement in general school results. The idea that music can have a positive effect on executive functions is nothing new,[26] although it's still far from clear how long this effect lasts.[27] The Jaschke study attempted to avoid the limitations and shortcomings of many previous studies. Consequently, there is hope that its conclusions will prove more reliable. And this hope is necessary because, in contrast, a previous meta-analysis found no evidence of far transfer as a result of learning how to play music.[28] Yes, it concluded that musicians are indeed often more intelligent than others (we love you, yeah, yeah, yeah), but this is more a correlation than anything else. As far as a possible causal link is concerned, in most studies this is negatively reflected in the quality of the study itself. The better the research, the smaller the link.

But is it actually a good thing to search for far transfer in relation to music? This is the question that the Organization for Economic Cooperation and Development (OECD) asked in its own review of the influence of art education in general and music education in particular.[29] By asking what value music has for improving performance in other disciplines, there is a risk that this effectively devalues music's worth as a discipline in its own right. This is a fair point: much far transfer thinking is based on the utility principle that makes one discipline subordinate to another. In wider cultural and educational terms, chess is less important than music. But perhaps chess also has the potential to make students better at something else. And perhaps it can do this more effectively than music. What then would be the future of music as an academic subject?

And it doesn't just have to be chess. Imagine that something else comes along—the use of classroom rituals, for example—that is proven to have a more significant impact on improved executive functions than music.[30] If music is regarded purely as a means to an end rather than as an end in itself, this might even lead to its removal from the curriculum! It's surprising that this issue should be raised by an economic organization like the OECD, but it's important that someone raises it. In art education, the desire for possible far transfer must remain subordinate to the wider cultural value of artistic disciplines—and not the other way around.

Does Learning Latin Help You to Learn Other Languages Better?

Apart from a huge fortune in the bank, what do *Harry Potter* author J. K. Rowling and Facebook guru Mark Zuckerberg have in common? They both learned Latin in school.[31] Various universities still use Latin names to add a certain cachet to the study of classics and classical languages. It is as though they seem to say that knowledge of Latin is the secret to success!

While in many countries (foreign) language education has given way to education based on the so-called STEM subjects (science, technology, engineering, and mathematics), in the Netherlands and Belgium, Latin is still an important part of the curriculum.[32] For centuries, Latin was the language of knowledge and erudition, and, consequently, also the language of the elite, as it was also an important key to the door that led to university. It was only when education became more readily accessible at the start of the 20th century, and when Latin gradually disappeared as the language of science and learning, that arguments for its teaching began to change. Latin was now seen as being important for the general education of students, which was effectively the same as saying that Latin was a good way to teach

students how to think. As a subsidiary argument, it was also suggested that learning Latin made it easier to learn other languages, such as French, Spanish, and/or Italian.[33]

But is this true? Does learning Latin teach you anything more than just Latin? During the past century, research has focused primarily on this second argument: Latin as a linguistic facilitator. A review study[34] found evidence supporting a weaker form of this argument, namely that learning Latin helped American children first and foremost learn their own language better. Unfortunately, many of the studies in this field lack reliability as a result of serious methodological shortcomings or due to a failure to properly check out all relevant related factors, such as the socioeconomic background of the students (see also Thorndike's conclusions on this matter). One small study that is both relevant and reliable monitored a group of German children learning Spanish. Some of the children also received lessons in Latin, others in French. The results showed that the children benefited more from first learning French, rather than Latin, before Spanish. In fact, the students who learned Latin made more grammatical errors in Spanish than those who had learned French.[35] Once again, Thorndike's identical elements theory would seem to hold.

As far as the second question is concerned—can learning Latin help you to think better?—very little meaningful research has been conducted, largely because it's so difficult to define what we mean by "thinking" to everyone's satisfaction. Be that as it may, one study[36] concluded that there was no relationship between the skills needed to learn Latin and the skills needed to learn other languages or mathematics. But that is more or less as far as the research goes at this stage. In other words, there is nothing to suggest a link between "learning Latin" and "better thinking."

If it's unlikely that Latin makes it possible to learn other languages more easily, and if Thorndike's theory suggests that far transfer is equally improbable, we can then reasonably ask the same question that we asked of music: Should Latin still be taught because of any intrinsic value of its own? Up to a point, the answer is yes. There are indications that learning Latin can lead to greater self-confidence and a deeper appreciation for other cultures,[37] although this can just as easily be said for many other foreign languages, such as Chinese.

The British classicist Mary Beard offers a more specific reason for learning Latin: it gives young people access to the literary tradition that forms the basis of Western culture.[38] Again, this might well be the case, but it's open to discussion as to whether that argument alone is sufficient to merit including Latin in the curriculum. In fact, all the "old" arguments in favor of Latin—that it has specific characteristics that make it easier to learn other languages and also improves a student's general ability to think—no longer seem relevant or credible in this modern day and age.

In this article, we investigated four popular examples of claims for far transfer, but in each case the results were disappointing. This is not to say that there is no evidence whatsoever for far transfer, but it's very clear that the level of reliable evidence decreases in relation to the quality of the research: the better the research, the scanter the evidence.

One insight—in fact, a slight irritation—that came to light during our investigation and writing is that Thorndike's theory—devised more than 100 years ago—still seems applicable. Throughout the past century, repeated efforts have been made to contradict his claim that the greater the number of identical elements, the greater the likelihood of far transfer. To date, no one has really succeeded, us included. Even so, it remains clear that far transfer is not the magic remedy for cross-discipline learning that many in education once hoped it would be. □

Endnotes

1. See P. De Bruyckere, P. A. Kirschner, and C. D. Hulshof, *Urban Myths about Learning and Education* (San Diego, CA: Academic Press, 2015).

2. D. N. Perkins and G. Salomon, "Transfer of Learning," in *International Encyclopedia of Education,* 2nd ed., ed. T. Husen and T. N. Postlethwaite (Oxford: Pergamon Press, 1992), 6452–6457. Mention is made of transfer or training, whereby the skills trained for in one domain have a positive effect in another domain.

3. Perkins and Salomon, "Transfer of Learning." Near transfer and far transfer have meant different things at different times. For example, J. M. Royer described the terms as follows: "I will use the term near transfer to refer to instances in which one classroom learned skill, or bit of knowledge, transfers to another classroom skill or bit of knowledge. I will use the term far transfer to refer to situations in which material learned in the classroom transfers to events or problems encountered outside of the classroom." See J. M. Royer, "Theories of the Transfer of Learning," *Educational Psychologist* 14, no. 1 (1979): 53–69.

4. E. L. Thorndike, "The Influence of First Year Latin upon the Ability to Read English," *School Sociology* 17 (1923): 165–168.

5. R. S. Woodworth and E. L. Thorndike, "The Influence of Improvement in One Mental Function upon the Efficiency of Other Functions," *Psychological Review* 8, no. 3 (1901): 247.

6. See, among others, I. J. Deary et al., "Intelligence and Educational Achievement," *Intelligence* 35 (2007): 548–555; and J. E. Hunter and R. F. Hunter, "Validity and Utility of Alternative Predictors of Job Performance," *Psychological Bulletin* 96 (1984): 72–98.

7. C. M. Reigegluth, ed., *Instructional-Design Theories and Models: An Overview of Their Current Status* (Hillsdale, NJ: Erlbaum Associates, 1983).

8. A. D. de Groot, *Het denken van den schaker* (Amsterdam: Noord-Hoolandsche Uitgevers Maatschappij, 1946).

9. There are two Armenian reports mentioning positive effects: R. Aghuzumtsyan and S. Poghosyan, "The Impact of Chess Lessons on Formation and Development of the Students," *International Conference Chess in Schools* (Yerevan: Zartprint, 2014), 87–97; and R. Mirzakhanyana et al., "Analysis of the Efficiency of Teaching Chess in Schools," *Sociology* 7, no. 1 (2017): 36–42. The first study shows correlations; the second illustrates how context plays a role.

10. F. Gobet and G. Campitelli, "Educational Benefits of Chess Instruction: A Critical Review," in *Chess and Education: Selected Essays from the Koltanowski Conference*, ed. T. Redman (Dallas: Chess Program at the University of Texas at Dallas, 2006), 139.

11. G. Sala, J. P. Foley, and F. Gobet, "The Effects of Chess Instruction on Pupils' Cognitive and Academic Skills: State of the Art and Theoretical Challenges," *Frontiers in Psychology* 8 (2017): 238.

12. G. Sala and F. Gobet, "Does Far Transfer Exist? Negative Evidence from Chess, Music, and Working Memory Training," *Current Directions in Psychological Science* 26 (2017): 515–520.

13. A. P. Burgoyne et al., "The Relationship between Cognitive Ability and Chess Skill: A Comprehensive Meta-Analysis," *Intelligence* 59 (2016): 72–83.

14. "Steve Jobs Says Everyone Should Learn to Program," YouTube video, posted by Scott Moss, July 5, 2012.

15. M. J. Mataric, *The Robotic Primer* (Cambridge, MA: MIT Press, 2007).

16. S. Papert, *Mindstorms: Children, Computers, and Powerful Ideas* (New York: Basic Books, 1980).

17. R. E. Mayer, "Different Problem-Solving Competencies Established in Learning Computer

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More Than a Warm Welcome

(Continued from page 8)

enabled them to overcome so much in search of a better future for their families. When asked about her hopes for her children, Adelah Saleh shares two, the first of which is fairly modest. She'd like to see them take more field trips in school—perhaps to a science museum or to the state capital, Lansing. But she also has something greater in mind. "I want them to be successful in life, to finish their education, and to spread peace," she says in Arabic, as Hamade, the family liaison, translates into English. "We came from a country with no peace. This is what we miss, and this is what we wanted." ☐

ELLs on the Cusp

(Continued from page 22)

23. Robinson, "Evaluating Criteria."

24. U.S. Department of Education, *English Learner Tool Kit*.

25. Cimpian, Thompson, and Makowski, "Evaluating English Learner Reclassification."

26. Estrada and Wang, "Making English Learning Reclassification."

27. ACLU of Southern California, *DJ v. State of California*, 2019, www.aclusocal.org/en/cases/dj-v-state-california.

28. Estrada and Wang, "Making English Learning Reclassification."

29. By law, no student scoring below the state threshold should even be considered for reclassification. But in reality, some students are reclassified without the required test scores. See Robinson, "Evaluating Criteria"; and Johnson, "The Effects of English Learner Classification."

30. Estrada and Wang, "Making English Learning Reclassification."

31. Pope, "The Marginal Effect"; and Reyes and Hwang, "Middle School Language Classification."

32. D. August, "Educating English Language Learners," *American Educator* 42, no. 3 (Fall 2018): 4–9, 38.

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(Continued from page 28)

8. D. Rohrer et al., "A Randomized Controlled Trial of Interleaved Mathematics Practice," *Journal of Educational Psychology*, advance online publication, http://dx.doi.org/10.1037/edu0000367.

9. D. Rohrer, "Interleaving Helps Students Distinguish among Similar Concepts," *Educational Psychology Review* 24 (2012): 355–367.

10. S. C. Pan, "The Interleaving Effect: Mixing It Up Boosts Learning," *Scientific American*, August 4, 2015.

11. D. Rohrer, R. F. Dedrick, and K. Burgess, "The Benefit of Interleaved Mathematics Practice Is Not Limited to Superficially Similar Kinds of Problems," *Psychonomic Bulletin & Review* 21 (2014): 1323–1330.

12. Open Up Resources, "Lesson 2: Introducing Proportional Relationships with Tables," https://access.openupresources.org/curricula/our6-8math/en/ccss/grade-7/unit-2/lesson-2/index.html.

13. H. Hausman and N. Kornell, "Mixing Topics while Studying Does Not Enhance Learning," *Journal of Applied Research in Memory and Cognition* 3 (2014): 153–160.

14. D. Rohrer, "Interleaving Helps Students Distinguish."

Transfer of Learning

(Continued from page 34)

Programming with and without Meaningful Models," *Journal of Educational Psychology* 67, no. 6 (1975): 725–734.

18. C. A. VanLengen and C. D. Maddux, "Does Instruction in Computer Programming Improve Problem Solving Ability," *Journal of Information Systems Education* 2, no. 2 (1990): 11–16.

19. Mayer, "Different Problem-Solving Competencies."

20. D. H. Clements and D. F. Gullo, "Effects of Computer Programming on Young Children's Cognition," *Journal of Educational Psychology* 76 (1984): 1051–1058.

21. D. Clements, "Research on Logo in Education: Is the Turtle Slow but Steady, or Not Even in the Race?," *Computers in the Schools* 2, no. 2–3 (1985): 55–71.

22. J. J. Tu and J. R. Johnson, "Can Computer Programming Improve Problem-Solving Ability?," *ACM SIGCSE Bulletin* 22, no. 2 (1990): 30–33.

23. J. Littlefield et al., "Learning LOGO: Method of Teaching, Transfer of General Skills, and Attitudes toward School and Computers," in *Teaching and Learning Computer Programming: Multiple Research Perspectives*, ed. R. E. Mayer (Hillsdale, NJ: Lawrence Erlbaum Associates, 1988), 111–135.

24. J. Sweller, R. Clark, and P. Kirschner, "Teaching General Problem-Solving Skills Is Not a Substitute for, or a Viable Addition to, Teaching Mathematics," *Notices of the American Mathematical Society* 57 (2010): 1303–1304.

25. A. C. Jaschke, H. Honing, and E. J. Scherder, "Longitudinal Analysis of Music Education on Executive Functions in Primary School Children," *Frontiers in Neuroscience* 12 (2018): 103.

26. S. A. Schmitt et al., "Strengthening School Readiness for Head Start Children: Evaluation of a Self-Regulation Intervention," *Early Childhood Research Quarterly* 30 (2015): 20–31.

27. R. Jacob and J. Parkinson, "The Potential for School-Based Interventions That Target Executive Function to Improve Academic Achievement: A Review," *Review of Educational Research* 85 (2015): 512–552.

28. Sala and Gobet, "Does Far Transfer Exist?"

29. E. Winner, T. Goldstein, and S. Vincent-Lancrin, *Educational Research and Innovation: Art for Art's Sake? The Impact of Arts Education* (Paris: OECD Publishing, 2013).

30. For how we say things, for example, through rituals, see V. Rybanska et al., "Rituals Improve Children's Ability to Delay Gratification," *Child Development* 89 (2018): 349–359.

31. For an extensive name list, see B. Britanniae, "Famous People Who Studied Latin," *Transparent Language* (blog), November 20, 2013, https://blogs.transparent.com/latin/famous-people-who-studied-latin.

32. E. Bracke and C. Bradshaw, "The Impact of Learning Latin on School Pupils: A Review of Existing Data," *Language Learning Journal* (2017): 1–11.

33. We suspect that even if there is a connection, it only applies for languages derived from Latin (French, Spanish, Portuguese, Italian), and less for languages like Finnish, Swahili, or Chinese. In other words: near transfer!

34. R. Masciantonio, "Tangible Benefits of the Study of Latin: A Review of Research," *Foreign Language Annals* 10 (1977): 375–382.

35. L. Haag and E. Stern, "In Search of the Benefits of Learning Latin," *Journal of Educational Psychology* 95 (2003): 174–178.

36. J. F. Carlisle, "The Influence of Study of a Second Language on Improvement in Spelling: A Longitudinal Study," *Reading and Writing* 5 (1993): 339–353.

37. Bracke and Bradshaw, "The Impact of Learning Latin."

38. M. Beard, "Does Latin 'Train the Brain'?," *Times Literary Supplement*, July 10, 2006.

Write to us!

We welcome comments on *American Educator* articles. Send letters to **ae@aft.org** or American Educator, 555 New Jersey Ave. N.W., Washington, DC 20001.

Community Schools

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Jennifer, Yancy, and Jason have developed strong and distinctive identities as community school teachers. They see their work extending beyond the classroom, in partnership with others, in order to advance deeper learning as well as to further the cause of social justice within their communities. Learning in their schools is designed to engage students and ignite their passions. From Jennifer's focus on project-based learning to Yancy's bilingual teaching about identity and power, students in community schools have rich opportunities to connect their learning to the world and to their lives.

Making sure that community school teachers and other adults can sustain this work requires a deep commitment to the type of democratic work structures that Jason and his colleagues have established. As the stories of these powerful teachers attest, embracing community schooling goes far beyond wraparound services. At its heart, this is a movement to redefine teaching and learning. ☐

Endnotes

1. A. Maier et al., *Community Schools as an Effective School Improvement Strategy: A Review of the Evidence* (Palo Alto, CA: Learning Policy Institute, 2017).

2. J. Daniel, K. H. Quartz, and J. Oakes, "Teaching in Community Schools: Creating Conditions for Deeper Learning," *Review of Research in Education* 43, no. 1 (2019): 453–480.