

A JOHN CATT PUBLICATION

10 THINGS SCHOOLS GET WRONG

AND HOW WE CAN GET THEM RIGHT



*“Thoughtful &
provocative...”*

Howard Gardner

DR JARED COONEY HORVATH
& DAVID BOTT

Reference List

Introduction

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Chapter 1

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Chapter 2

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Chapter 3

Grades

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(p. 39) ...a person's worldview drives his/her top-down expectations.

Kveraga, K., Ghuman, A. S., & Bar, M. (2007). Top-down predictions in the cognitive brain. *Brain and cognition*, 65(2), 145-168.

(p. 39) ..."To a man with a hammer..."

Maslow, A.H. (1966). *The Psychology of Science: A Reconnaissance*. New York, USA: Harper & Row, 15-16.

(p. 39) ..."The medium is the message."

Mcluhan, M. (2003 – originally published in 1964). *Understanding Media: The Extensions of Man*. New York, USA: McGraw-Hill, 25.

(p. 39/40) ..."Tools alter the structure of our interests..."

Postman, N. (1993). *Technopoly: The Surrender of Culture to Technology*. New York, USA: Knopf, 20.

(p. 40) In 1792, Cambridge University professor William Farish...

Hoskin, K. (1979). The examination, disciplinary power and rational schooling. *History of Education*, 8(2), 135-146.

Postman, N. (1993). *Technopoly: The Surrender of Culture to Technology*. New York, USA: Knopf, 13.

(p. 41) Reification is the process of...

Taussig, M. T. (1980). Reification and the consciousness of the patient. *Social Science & Medicine. Part B: Medical Anthropology*, 14(1), 3-13.

Gould, S.J. (1981). *The Mismeasure of Man*. New York, USA: W. W. Norton & Company.

Sfard, A. (1994). Reification as the birth of metaphor. *For the learning of mathematics*, 14(1), 44-55.

(p. 41) ...Brad Pitt's face is highly symmetrical...

Schmid, K., Marx, D., & Samal, A. (2008). Computation of a face attractiveness index based on neoclassical canons, symmetry, and golden ratios. *Pattern Recognition*, 41(8), 2710-2717.

Koronowski, L. (2017). *Scientifically Beautiful*. Huffpost. Available at: https://www.huffingtonpost.com.au/entry/scientifically-beautiful_n_2741136?ri18n=true

(p. 43) ...sat the world's first standardized test of Creativity...

Cook, H. (2018). *Do You Have the New Skills Victorian Students are Being Tested For?* The Age. Available At: <https://www.theage.com.au/national/victoria/do-you-have-the-new-skills-victorian-students-are-being-tested-for-20180202-p4yz9n.html>

(p. 43) ...schools can purchase CLARA...

Deakin Crick, R., Huang, S., Ahmed Shafi, A., & Goldspink, C. (2015). Developing resilient agency in learning: The internal structure of learning power. *British Journal of Educational Studies*, 63(2), 121-160.

Barratt-See, G., Cheng, M., Crick, R. D., & Shum, S. B. (2017). Assessing Resilient Agency with CLARA: Empirical Findings from Piloting a Visual Analytics Tool at UTS. In *Proc. 3rd Univ. Students, Transit., Achiev., Retent. Success Conf.*

(p. 43) ...a paid program can teach them how to boost their score...

Available at: <http://learningemergence.net/about/learning-futures-design-principles/>

(p. 43) ...schools can access Assessment and Teaching of 21st Century Skills...

Ithaca Group (2016). Everybody's Core Business – Supplementary Report: Findings from the Literature. p.16. Available at:

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwicz8Kv35zsAhVf4nMBHb0QDoEQFjAAegQIARAC&url=https%3A%2F%2Fdocs.education.gov.au%2Fsystem%2Ffiles%2Fdoc%2Fother%2Feverybodys_core_business_-_supplementary_report.pdf&usg=AOvVaw3LDPJw0Mlw2w0tjga1yuKL

(p. 44) ...Washington Post published an article...

Strauss, V. (2015). What's the Purpose of Education in the 21st Century? Available at: <https://www.washingtonpost.com/news/answer-sheet/wp/2015/02/12/whats-the-purpose-of-education-in-the-21st-century/>

(p. 45) ...[Narcissism] means they are farming-out their identity...

Lowen, A. (1985). *Narcissism: Denial of the True Self*. New York, USA: Simon & Schuster.

Chapter 4

Homework

(p. 51) You can do anything...

David Allen. As quoted in Hammonds, K.H. (2000). You can do anything – but not everything. Fastcompany. Available at: <https://www.fastcompany.com/40384/you-can-do-anything-not-everything>

(p. 51) ...install drain pipes with a gradient of at least 1.65%...

Commonwealth of Australia (2009). *Grade and Fall*. Available at: https://emedia.rmit.edu.au/dlswweb/Toolbox/plumbing/toolbox12_01/units/cpcpdr4001a_sanitary/03_size/page_001.htm

(p. 51) ...a country with around 10,000 schools...

Australian Bureau of Statistics (2019). *Schools*. Available at: <https://www.abs.gov.au/statistics/people/education/schools/latest-release>

(p. 51) ...over 350 million hours of homework.

Calculation based on the following.

- 3,948,811 million students (*Australian Bureau of Statistics*)
- 30min of homework per student per evening
- 180-days in the school year.

$(3,948,811 \times 30 \times 180) / 60 = 355,392,990$ hours

(p. 51) ...over 90% of teenagers fail to meet basic daily physical recommendations...

Australia Institute of Health and Welfare (2018). *Physical Activity Across the Life Stages*, 13. Available at: <https://www.aihw.gov.au/reports/physical-activity/physical-activity-across-the-life-stages/contents/table-of-contents>

(p. 53) Even a cursory glance at the last century of literature...

Gill, B. P., & Schlossman, S. L. (2004). Villain or savior? The American discourse on homework, 1850-2003. *Theory into practice*, 43(3), 174-181.

(p. X) ...California passed a law in 1901...

Mehta, S. (2009). When homework is busywork. The Los Angeles Times. Available at: <https://www.latimes.com/archives/la-xpm-2009-mar-22-me-homework22-story.html>

(p. 53) ...a strong Cold War-influenced pro-homework movement...

Gill, B. P., & Schlossman, S. L. (2003). A nation at rest: The American way of homework. *Educational Evaluation and Policy Analysis*, 25(3), 319-337.

(p. 54) ..."Homework is a long-standing education tradition..."

Vatterott, C. (2009). *Rethinking Homework: Best Practices that Support Diverse Needs*. Alexandria, VA: ASCD Press, 1.

(p. 54) ...due to its historical association with the concept of 'rigour'.

Davidson, C.N. (2020). Quantity is not Rigour. Inside Higher Ed. Available at: <https://www.insidehighered.com/advice/2020/05/13/academics-should-rethink-way-they-assign-homework-opinion>

Blackburn, B.R. (2012). *Rigor is Not a Four-Letter Word*. Routledge Press.

(p. 55) ...a recent review only returned five published articles...

Ramdass, D., & Zimmerman, B. J. (2011). Developing self-regulation skills: The important role of homework. *Journal of advanced academics*, 22(2), 194-218.

(p. 55) Regarding the one paper that conducted an experimental intervention...

Stoeger, H., & Ziegler, A. (2008). Evaluation of a classroom based training to improve self-regulation in time management tasks during homework activities with fourth graders. *Metacognition and Learning*, 3(3), 207-230.

(p. 55) The remaining four correlational papers...

Bembenuddy, H. (2009). Self-regulation of homework completion. *Psychology Journal*, 6(4), 138-153.

Kitsantas, A., & Zimmerman, B. J. (2009). College students' homework and academic achievement: The mediating role of self-regulatory beliefs. *Metacognition and Learning*, 4(2), 97-110.

Xu, J. (2008). Validation of scores on the homework management scale for middle school students. *The Elementary School Journal*, 109(1), 82-95.

Zimmerman, B. J., & Kitsantas, A. (2005). Homework practices and academic achievement: The mediating role of self-efficacy and perceived responsibility beliefs. *Contemporary Educational Psychology*, 30(4), 397-417.

(p. X) ..."There's been no research done on whether homework teaches...

Kralovec, E. & Bruell, J. (2000). *The End of Homework: How Homework Disrupts Families, Overburdens Children, and Limits Learning*. Boston, USA: Beacon, 13.

(p. 56) ..."is rationalized by invoking a notion called BGUTI...

Kohn, A. (2011). Well, fuh – ten obvious truths that we shouldn't be ignoring. *American School Board Journal*. Available at: <https://www.alfiekohn.org/article/well-duh-ten-obvious-truths-shouldnt-ignoring/>

(p. 58) In general, this work demonstrates that homework does have a positive effect...

Cooper, H. (1989). Synthesis of research on homework. *Educational leadership*, 47(3), 85-91.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. *Review of educational research*, 76(1), 1-62.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge, 234.

(p. 58) ...little-to-no learning benefit among Primary Years students.

Cooper, H. (1989). Synthesis of research on homework. *Educational leadership*, 47(3), 85-91.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. *Review of educational research*, 76(1), 1-62.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge, 235.

Farrow, S., Tymms, P., & Henderson, B. (1999). Homework and attainment in primary schools. *British Educational Research Journal*, 25(3), 323-341.

(p. 58) ...few young students have developed strong inhibitory mechanisms.

Schachar, R., & Logan, G. D. (1990). Impulsivity and inhibitory control in normal development and childhood psychopathology. *Developmental psychology*, 26(5), 710.

Zelazo, P. D., Carlson, S. M., & Kesek, A. (2008). *The development of executive function in childhood*. In C. A. Nelson & M. Luciana (Eds.), *Developmental cognitive neuroscience. Handbook of developmental cognitive neuroscience* (p. 553–574). MIT Press.

Leon-Carrion, J. O. S. E., García-Orza, J. A. V. I. E. R., & Pérez-Santamaría, F. J. (2004). Development of the inhibitory component of the executive functions in children and adolescents. *International Journal of Neuroscience*, 114(10), 1291-1311.

Shing, Y. L., Lindenberger, U., Diamond, A., Li, S. C., & Davidson, M. C. (2010). Memory maintenance and inhibitory control differentiate from early childhood to adolescence. *Developmental Neuropsychology*, 35(6), 679-697.

(p. 58) ...older students typically devote study time...

Dufresne, A., & Kobasigawa, A. (1989). Children's spontaneous allocation of study time: Differential and sufficient aspects. *Journal of Experimental Child Psychology*, 47(2), 274-296.

Muhlenbruck, L., Cooper, H., Nye, B., & Lindsay, J. J. (1999). Homework and achievement: Explaining the different strengths of relation at the elementary and secondary school levels. *Social Psychology of Education*, 3(4), 295-317.

(p. 58) ...these two issues can be mitigated through adult intervention.

Cooper, H., Jackson, K., Nye, B., & Lindsay, J. J. (2001). A model of homework's influence on the performance evaluations of elementary school students. *The Journal of Experimental Education*, 69(2), 181-199.

Miller, D. L., & Kelley, M. L. (1991). Interventions for improving homework performance: A critical review. *School Psychology Quarterly*, 6(3), 174.

Evidence for Learning (2019). Working with Parents to Support Children's Learning. Available at: <https://evidenceforlearning.org.au/guidance-reports/working-with-parents-to-support-childrens-learning/>

Nadon, I., & Normandeau, S. (1997). Can Parents' Involvement with Homework Moderate the Relation between Children's Cognitive Abilities and School Achievement?.

(p. 59) When we shift our focus to older students, the news becomes slightly better.

Cooper, H. (1989). Synthesis of research on homework. *Educational leadership*, 47(3), 85-91.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. *Review of educational research*, 76(1), 1-62.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge, 235.

(p. 59) ...correlation between duration and outcome is *not* linear.

Cooper, H., & Valentine, J. C. (2001). Using research to answer practical questions about homework. *Educational psychologist*, 36(3), 143-153.

Dettmers, S., Trautwein, U., & Lüdtke, O. (2009). The relationship between homework time and achievement is not universal: Evidence from multilevel analyses in 40 countries. *School Effectiveness and school improvement*, 20(4), 375-405.

Fernández-Alonso, R., Suárez-Álvarez, J., & Muñiz, J. (2015). Adolescents' homework performance in mathematics and science: personal factors and teaching practices. *Journal of Educational Psychology*, 107(4), 1075.

Blazer, C. (2009). Homework. Literature Review. *Research Services, Miami-Dade County Public Schools*. Available at: <https://eric.ed.gov/?id=ED536245>

Daw, J. (2012). Parental income and the fruits of labor: Variability in homework efficacy in secondary school. *Research in social stratification and mobility*, 30(3), 246-264.

Trautwein, U., Köller, O., Schmitz, B., & Baumert, J. (2002). Do homework assignments enhance achievement? A multilevel analysis in 7th-grade mathematics. *Contemporary Educational Psychology*, 27(1), 26-50.

(p. 59) ...Primary Year students are assigned an average of 35 minutes...

Juster, F. T., Ono, H., & Stafford, F. P. (2004). Changing times of American youth: 1981-2003. *Institute for Social Research, University of Michigan, Ann Arbor, Michigan*, 48106.

University of Phoenix (2014). Homework Anxiety: Survey Reveals How Much Homework K-12 Students are Assigned. Available at: <https://www.businesswire.com/news/home/20140225005795/en/Homework-Anxiety-Survey-Reveals-How-Much-Homework-K-12-Students-Are-Assigned-and-Why-Teachers-Deem-It-Beneficial>

(p. 59) ...Middle-and-Upper Year students are assigned an average of 90 minutes...

National Center for Educational Statistics (2011). Youth Indicators 2011. Available at: https://nces.ed.gov/pubs2012/2012026/tables/table_35.asp

Galloway, M., Conner, J., & Pope, D. (2013). Nonacademic effects of homework in privileged, high-performing high schools. *The journal of experimental education*, 81(4), 490-510.

(p. 59) ...approximately 60% of students cite homework as a primary source of stress...

Galloway, M., Conner, J., & Pope, D. (2013). Nonacademic effects of homework in privileged, high-performing high schools. *The journal of experimental education*, 81(4), 490-510.

(p. 59) ...30% of students in some countries are categorized as clinically depressed...

Lee, M., & Larson, R. (2000). The Korean 'examination hell': Long hours of studying, distress, and depression. *Journal of Youth and Adolescence*, 29(2), 249-271.

(p. 60) ...pursuing personal passions with like-minded peers...

Jakubiak, B. K., & Feeney, B. C. (2016). Daily goal progress is facilitated by spousal support and promotes psychological, physical, and relational well-being throughout adulthood. *Journal of Personality and Social Psychology*, 111(3), 317.

Feeney, B. C., Van Vleet, M., Jakubiak, B. K., & Tomlinson, J. M. (2017). Predicting the pursuit and support of challenging life opportunities. *Personality and Social Psychology Bulletin*, 43(8), 1171-1187.

Tomlinson, J. M., Feeney, B. C., & Van Vleet, M. (2016). A longitudinal investigation of relational catalyst support of goal strivings. *The journal of positive psychology*, 11(3), 246-257.

(p. 60) ...homework largely boosts learning when it is task-based...

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge, 235.

Cooper, H., Jackson, K., Nye, B., & Lindsay, J. J. (2001). A model of homework's influence on the performance evaluations of elementary school students. *The Journal of Experimental Education*, 69(2), 181-199.

NZ Herald (2010). *Experts assess the Homework Issue*. Available at: https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10641944

(p. 60) ...reading with parents is a great way...

Kalb, G., & Van Ours, J. C. (2014). Reading to young children: A head-start in life?. *Economics of Education Review*, 40, 1-24.

Hutton, J. S., Horowitz-Kraus, T., Mendelsohn, A. L., DeWitt, T., Holland, S. K. (2015). Home reading environment and brain activation in preschool children listening to stories. *Pediatrics*, 136(3), 466-478.

(p. 61) ..."The ache for home lives in all of us..."

Angelou, M. (1986). *All God's Children Need Traveling Shoes*. Random House.

Chapter 5

Mindset

(p. 63) If we have the truth, it cannot be harmed by investigation...

Clark, J.R. (1983). *The Church Years*. Provo, USA: Brigham Young University Press, 24.

(p. 63) ...the story of Roger Bannister...

Holland, G. (1955). 1954 & it's sportsman: Roger Bannister. *Sports Illustrated*. Available at: <https://vault.si.com/vault/1955/01/03/1954-its-sportsman-roger-bannister>

(p. 63) ...nearly 1,500 runners would break the 4-minute mile...

Brannen, N. (2018). Only 1,497 humans have ever broken the 4-minute mile – and I'm one of them. *CBC Sports*. Available at: <https://www.cbc.ca/playersvoice/entry/only-1497-humans-have-ever-broken-the-4-minute-mile-and-im-one-of-them>

(p. 63) ..."What changed was the mental model..."

Wind, Y. & Crook, C. (2000). *The Power of Impossible Thinking*. Philadelphia, USA: Wharton School Pub, 22.

(p. 64) ...Carol Dweck published one of the most popular and impactful books...

Dweck, C.S. (2006). *Mindset*. New York, USA: Ballantine Books.

(p. 64) ...consider the Google Books description of Dweck's book...

Available at:
https://books.google.com.au/books/about/Mindset.html?id=bOGHDQAAQBAJ&source=kp_book_description&redir_esc=y

(p. 64) ...you may want to watch her 2014 Tedx Talk...

Available at:
https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?language=en

(p. 65) ...what researchers call face validity.

Holden, R. B. (2010). "*Face validity*". In Weiner, Irving B.; Craighead, W. Edward (eds.). *The Corsini Encyclopedia of Psychology (4th ed.)*. Hoboken, USA: Wiley, 637–638.

(p. 65) Dweck's early research has demonstrated...

Licht, B. G., & Dweck, C. S. (1984). Determinants of academic achievement: The interaction of children's achievement orientations with skill area. *Developmental psychology*, 20(4), 628.

Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of personality and social psychology*, 75(1), 33.

Grant, H., & Dweck, C. S. (2003). Clarifying achievement goals and their impact. *Journal of personality and social psychology*, 85(3), 541.

(p. 66) ...published the most comprehensive meta-analyses of mindset ever compiled.

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological science*, 29(4), 549-571.

(p. 66) ...conducted a replication of her work.

Li, Y., & Bates, T. C. (2019). You can't change your basic ability, but you work at things, and that's how we get hard things done: Testing the role of growth mindset on response to setbacks, educational attainment, and cognitive ability. *Journal of Experimental Psychology: General*, 148(9), 1640.

(p. X) ...2 million peer-reviewed articles are published annually.

Altbach, P.G., & de Wit, H. (2018). Too much academic research is being published. *University World News*. Available at:
<https://www.universityworldnews.com/post.php?story=20180905095203579>

(p. 67) ...up to 40% of articles within the social sciences...

Pendlebury, D. A. (1991). Science, citation, and funding. *Science*, 251(5000), 1410-1411.

(p. 67) ...up to 80% of papers within the humanities...

Larivière, V., Gingras, Y., & Archambault, É. (2009). The decline in the concentration of citations, 1900–2007. *Journal of the American Society for Information Science and Technology*, 60(4), 858-862.

(p. 67) ...research articles are read in their entirety by only 10 people.

Biswas, A.K., & Kirchherr, J. (2015). Prof, no one is reading you. *The Straits Times*. Available at: <https://www.straitstimes.com/opinion/prof-no-one-is-reading-you>

(p. 67) ...ask how many peer-reviewed journal articles s/he has read...

Latham, G. (1993). Do educators use the literature of the profession?. *NASSP Bulletin*, 77(550), 63-70.

Zeuli, J. S. (1994). How do teachers understand research when they read it?. *Teaching and teacher education*, 10(1), 39-55.

(p. 68) [mindset] has profound effects...on students learning and school achievement...

Dweck, C.S. (2008). *Brainology*. Available at: <https://www.nais.org/magazine/independent-school/winter-2008/brainology/>

(p. 68) ...[mindset] can matter even more than cognitive factors...

Dweck, C.S., Walton, G.M., & Cohen, G.L. (2014). Academic Tenacity. *Bill & Melinda Gates Foundation*, 2. Available at: <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjgm9Xn6qPsAhUByzgGHT7SBusQFjABegQIBxAC&url=https%3A%2F%2Ffiles.eric.ed.gov%2Ffulltext%2FED576649.pdf&usg=AOvVaw153PdRlgV7kQqNGvvh3Rm3>

(p. 68) ...mindsets play a key role in math and science achievement.

Dweck, C.S. (2008). Mindsets and Math/Science Achievement. *The Opportunity Equation*, 2. Available at: http://www.growthmindsetmaths.com/uploads/2/3/7/7/23776169/mindset_and_math_science_achievement_-_nov_2013.pdf

(p. 68) ...if we changed student mindsets we could boost their achievement.

Dweck, C.S. (2015). Carol Dweck revisits the growth mindset. *Education Week*. Available at: <https://www.edweek.org/ew/articles/2015/09/23/carol-dweck-revisits-the-growth-mindset.html>

(p. 68) ...emphasis on growth can not only increase intellectual achievement...

Dweck, C. S. (2012). Mindsets and human nature: Promoting change in the Middle East, the schoolyard, the racial divide, and willpower. *American Psychologist*, 67(8), 614–622.

(p. 69) ...expectancy priming...

Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of experimental social psychology*, 35(1), 4-28.

Chase, C. I. (1979). The impact of achievement expectations and handwriting quality on scoring essay tests. *Journal of Educational Measurement*, 16(1), 39-42.

Dusek, J. B., & Joseph, G. (1983). The bases of teacher expectancies: A meta-analysis. *Journal of Educational psychology*, 75(3), 327.

Johns, M., Schmader, T., & Martens, A. (2005). Knowing is half the battle: Teaching stereotype threat as a means of improving women's math performance. *Psychological Science*, 16(3), 175-179.

Horvath, J.C. (2019). *Stop Talking, Start Influencing: 12 Insights from Brain Science to Make Your Message Stick*. Dunedin, NZ: Exisle Press, 200-201.

(p. 69) ..."no support for the idea that fixed [mindsets] are harmful..."

Li, Y., & Bates, T. C. (2019). You can't change your basic ability, but you work at things, and that's how we get hard things done: Testing the role of growth mindset on response to setbacks, educational attainment, and cognitive ability. *Journal of Experimental Psychology: General*, 148(9), 1640.

(p. 69) Priming is a notoriously fickle cognitive occurrence...

Kahneman, D. (2012). Open letter as referenced by Yong, E.(2012). Nobel laureate challenges psychologists to clean up their act. *Nature*.

Cesario, J. (2014). Priming, replication, and the hardest science. *Perspectives on Psychological Science*, 9(1), 40-48.

Ramscar, M., Shaoul, C., Baayen, R. H., & Tbingen, E. K. U. (2015). Why many priming results don't (and won't) replicate: A quantitative analysis. *Manuscript, University of Tübingen*.

(p. X) In response, dweck has argued that the contradictory findings...

Dweck, C. S., & Yeager, D. S. A Simple Re-Analysis Overturns a “Failure to Replicate” and Highlights an Opportunity to Improve Scientific Practice: Commentary on Li and Bates (in press).

(p. 69) ...in her famous 2007 research...

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child development, 78*(1), 246-263.

(p. 69) ...shown to have no significant impact on later maths exam performance...

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child development, 78*(1), 246-263.

(p. 69/70) ...in 2019, Dweck and colleagues published another study...

Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., ... & Paunesku, D. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature, 573*(7774), 364-369.

(p. 70) ...differentiate between statistical significance and clinical significance.

Turk, D.C. (2000). Statistical significance and clinical significance are not synonymous! *The Clinical Journal of Pain, 16*(3), 185-187.

(p. 70) ...economically disadvantaged students at risk of dropping out of school...

Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological science, 29*(4), 549-571.

(p. 71) One recent analysis from Brown University...

Kraft, M. A. (2020). Interpreting effect sizes of education interventions. *Educational Researcher, 49*(4), 241-253.

(p. 72) ..."In the beginning...we did not recognize the complexity..."

Dweck, C.S. (2020). *In* Severs, J. Growth mindset: where did it go wrong? *Times Education Supplement*. Available at: <https://www.tes.com/news/growth-mindset-where-did-it-go-wrong>

(p. 73) ..."The most competitive individual I'd ever met".

Grover, T. (Retrieved: 2020). Available at: <https://www.hoopsvibe.com/features/284549-michael-jordan-was-the-best-because-he-worked-the-hardest-rare-workout-footage-video>

Chapter 6

21st Century Skills

(p. 77) The illiterate of the 21st century...

Toffler, A. (1970). *Future shock*. New York, USA: Bantam, 414.

(p. 77) Standardized curricula were first proposed in 1576...

Hamilton, D. (2013). *Towards a Theory of Schooling (Routledge Revivals)*. London, UK: Routledge, 55.

Petrus Ramus (accessed 2020). The New World Encyclopedia. Available at: https://www.newworldencyclopedia.org/entry/Petrus_Ramus

(p. 77) By the mid-17th century, curricula were widely used throughout Europe...

Lundgren, U. P. (2015). When curriculum theory came to Sweden. *Nordic Journal of Studies in Educational Policy*, 2015(1), 27000.

Hamilton, D. (2013). *Towards a Theory of Schooling (Routledge Revivals)*. London, UK: Routledge, 55.

(p. 78) ...the C21 skills were established at a breakfast meeting...

Available at:

<https://web.archive.org/web/20021210162514/http://21stcenturyskills.org/events.html>

(p. 78) ...these companies released a document...

Partnership for 21st Century Skills (2002). Learning for the 21st Century: A Report and Mile Guide for 21st Century Skills. Available at: <https://eric.ed.gov/?id=ED480035>

(p. 79) An estimated fifty percent of entry-level hires don't reach the 18-month mark...

Kislik, L. (2018). What to do when you realize you made a bad hire. *Harvard Business Review*. Available at: <https://hbr.org/2018/08/what-to-do-when-you-realize-you-made-a-bad-hire>

Sullivan, J. (2017). Ouch, 50% of new hires fail. *ERE Media*. Available at: <https://www.ere.net/ouch-50-of-new-hires-fail-6-ugly-numbers-revealing-recruitings-dirty-little-secret/>

(p. 79) ...require up to 24-months...

Bidwell, M. (2011). Paying more to get less: The effects of external hiring versus internal mobility. *Administrative Science Quarterly*, 56(3), 369-407.

(p. 79) ...no longer require employees to hold a four-year degree...

Akhtar, A. (2019). Apple, Google, and Netflix don't require employees to have 4-year degrees, and this could soon become an industry norm. *Business Insider Australia*. Available at: <https://www.businessinsider.com.au/top-companies-are-hiring-more-candidates-without-a-4-year-degree-2019-4?r=US&IR=T>

(p. 79) An estimated fifty percent of new-hires across every level of employment...

Sullivan, J. (2017). Ouch, 50% of new hires fail. *ERE Media*. Available at: <https://www.ere.net/ouch-50-of-new-hires-fail-6-ugly-numbers-revealing-recruitings-dirty-little-secret/>

(p. 79) ...17-months and five billion dollars of lost revenue later...

Halkias, M. (2020). J.C. Penney files for bankruptcy. *The Dallas Morning News*. Available at: <https://www.dallasnews.com/business/retail/2020/05/15/jc-penney-files-for-bankruptcy-a-crushing-one-as-it-was-making-progress-to-fix-itself/>

Reingold, J. (2014). How to fail in business while really, really trying. *Fortune Magazine*. Available at: <https://fortune.com/2014/03/20/how-to-fail-in-business-while-really-really-trying/>

Ladd, B. (2018). Killing JC Penney: can the iconic retailer be saved? *Forbes*. Available at: <https://www.forbes.com/sites/brittainladd/2018/07/15/killing-jc-penney-can-the-iconic-retailer-be-saved/#26c6cea361bf>

(p. 79) ... highly contentious merger and the subsequent layoff of 30,000 employees...

Barbaro, M. (2015). As boss, Carly Fiorina was a contradictory figure. *New York Times*. Available at: <https://www.nytimes.com/2015/10/27/us/politics/carly-fiorina-was-contradictory-figure-at-hewlett-packard.html>

(p. 80) ... transfer refers to the ability to apply skills learned in one context...

Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn?: A taxonomy for far transfer. *Psychological bulletin*, 128(4), 612.

(p. 81) ... magnetoencephalography data was published...

Under this scenario, the issue was most likely one of shielding. Due to the sensitivity of SQUIDS, without effective shielding it will pick up signals from any strong electromagnetic signal. In this instance, the 6 cycles per hour almost certainly aligned with the local subway schedule and the MEG was picking up the signal from passing public transportation.

If, however, this data was accurate, it would suggest that ephaptic coupling works via quantum entanglement.

(p. 81) ... knowledge precedes skills.

Willingham, DT (2009). *Why Don't Students Like School?* Josey-Bass, 19-39.

(p. 82) BAR GRAPH

Adapted using data from:

Recht, D. R., & Leslie, L. (1988). Effect of prior knowledge on good and poor readers' memory of text. *Journal of Educational Psychology*, 80(1), 16.

(p. 82) ... domain knowledge has been internally embedded within long-term memory...

Tricot, A., & Sweller, J. (2014). Domain-specific knowledge and why teaching generic skills does not work. *Educational psychology review*, 26(2), 265-283.

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(p. 83) ... they commit fewer facts to memory.

Sparrow, B., Liu, J., & Wegner, D. M. (2011). Google effects on memory: Cognitive consequences of having information at our fingertips. *science*, 333(6043), 776-778.

Fisher, M, Goddu, MK & Keil, FC (2015). Searching for explanations: how the internet inflates estimates of internal knowledge. *Journal of Experimental Psychology: General*, 144(3), p. 674-685.

(p. 83) ... "The processes we most hope to engender in our students..."

Willingham, DT (2009). *Why Don't Students Like School?* Josey-Bass, 28.

(p. 83) ...the same skill can differ significantly when applied to different contexts.

Green, B. N., & Johnson, C. D. (2015). Interprofessional collaboration in research, education, and clinical practice: working together for a better future. *Journal of Chiropractic Education*, 29(1), 1-10.

(p. 84) ...the human brain possesses a unique dual-system learning apparatus...

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Taylor, J. A., & Ivry, R. B. (2012). The role of strategies in motor learning. *Annals of the New York Academy of Sciences*, 1251, 1.

(p. 84) ...frontal regions...coupled with rhythmic activity across deeper memory...

Benchenane, K., Peyrache, A., Khamassi, M., Tierney, P. L., Gioanni, Y., Battaglia, F. P., & Wiener, S. I. (2010). Coherent theta oscillations and reorganization of spike timing in the hippocampal-prefrontal network upon learning. *Neuron*, 66(6), 921-936.

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Soto, D., Humphreys, G. W., & Heinke, D. (2006). Dividing the mind: The necessary role of the frontal lobes in separating memory from search. *Neuropsychologia*, 44(8), 1282-1289.

Hyman, J. M., Zilli, E. A., Paley, A. M., & Hasselmo, M. E. (2010). Working memory performance correlates with prefrontal-hippocampal theta interactions but not with prefrontal neuron firing rates. *Frontiers in integrative neuroscience*, 4, 2.

Savage, C. R., Deckersbach, T., Heckers, S., Wagner, A. D., Schacter, D. L., Alpert, N. M., ... & Rauch, S. L. (2001). Prefrontal regions supporting spontaneous and directed application of verbal learning strategies: evidence from PET. *Brain*, 124(1), 219-231.

(p. 84) ...enhanced activity within the basal ganglia...

Yin, H. H., & Knowlton, B. J. (2006). The role of the basal ganglia in habit formation. *Nature Reviews Neuroscience*, 7(6), 464-476.

Packard, M. G., & Knowlton, B. J. (2002). Learning and memory functions of the basal ganglia. *Annual review of neuroscience*, 25(1), 563-593.

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Treisman, A., Vieira, A., & Hayes, A. (1992). Automaticity and preattentive processing. *The American journal of psychology*, 341-362.

Strayer, D. L., & Kramer, A. F. (1994). Strategies and automaticity: I. Basic findings and conceptual framework. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20(2), 318.

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(p. 85) A set of seminal psychological experiments from the 1980's...

Chase, W. G., & Ericsson, K. A. (1982). Skill and working memory. In *Psychology of learning and motivation* (Vol. 16, pp. 1-58). Academic Press.

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Ericsson, K. A., Chase, W. G., & Faloon, S. (1980). Acquisition of a memory skill. *Science*, 208(4448), 1181-1182.

Ericsson, K. A., & Staszewski, J. J. (1989). Skilled memory and expertise: Mechanisms of exceptional performance. *Complex information processing: The impact of Herbert A. Simon*, 2, 235-267.

(p. 85/86) LINE GRAPHS

Adapted using data from:

Chase, W. G., & Ericsson, K. A. (1982). Skill and working memory. In *Psychology of learning and motivation* (Vol. 16, pp. 1-58). Academic Press.

Ericsson, K. A., Chase, W. G., & Faloon, S. (1980). Acquisition of a memory skill. *Science*, 208(4448), 1181-1182.

(p. 87) ...prior automated patterns have an annoying tendency to re-constitute...

Mackintosh, N. J. (1963). Extinction of a discrimination habit as a function of overtraining. *Journal of Comparative and Physiological Psychology*, 56(5), 842.

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(p. 87) ...taking in, organizing, and acting upon knowledge...is the process of learning.

Biggs, J. B., & Collis, K. F. (2014). *Evaluating the quality of learning: The SOLO taxonomy (Structure of the Observed Learning Outcome)*. Academic Press.

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Bird, B. (2017). What percentage of college students fail their first semester? *The Classroom*. Available at: <https://www.theclassroom.com/percentage-college-students-fail-first-semester-7610.html>

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Smydo, J. (2008). First-year college students often fail as 'life intervenes'. *The Pittsburgh Post Gazette*. Available at: <https://www.post-gazette.com/local/neighborhoods/2008/09/02/First-year-college-students-often-fail-as-life-intervenes/stories/200809020227>

(p. 89) ...over 90%...can differentiate study techniques, less than 35% actually adhere...

Foerst, N. M., Klug, J., Jöstl, G., Spiel, C., & Schober, B. (2017). Knowledge vs. action: discrepancies in university students' knowledge about and self-reported use of self-regulated learning strategies. *Frontiers in psychology*, 8, 1288.

Chapter 7

Computers

(p. 91) “Humanity is acquiring all the right technology for all the wrong reasons.”

Buckminster Fuller, R. (1966). Available at:
<https://www.goodreads.com/quotes/93734-humanity-is-acquiring-all-the-right-technology-for-all-the>

(p. 91) ...92% of students reported having access to a computer at school.

OECD (2015). *Students, Computers, and Learning: Making the Connection*. PISA, OECD Publishing, 62.

(p. 91) ...99.7% of schools are equipped with high-speed internet...

Network for Learning (Accessed 2020). Available at:
<https://www.treasury.govt.nz/information-and-services/commercial-portfolio-and-advice/commercial-portfolio/network-learning-limited>

MacMahon, R. (2020). NZ’s internet is faster than ever, but a digital nation? Nope. *The Spinoff*. Available at: <https://thespinoff.co.nz/business/22-11-2019/nzs-internet-is-faster-than-ever-but-challenges-still-lay-ahead/>

(p. 91) ...the computer-to-student ratio has dipped below 1:1...

OECD (2015). *Students, Computers, and Learning: Making the Connection*. PISA, OECD Publishing, 65.

(p. 91/92) ...yearly expenditure of K-12 learning software exceeds \$8 billion annually...

Software and Information Industry Association (2015). *SIAA Estimates \$8.38 Billion US Market for PreK-12 Educational Software and Digital Content*. Available at:
<https://www.siaa.net/Press/SIAA-Estimates-838-Billion-Dollars-US-Market-for-PreK-12-Educational-Software-and-Digital-Content>

(p. 92) ...schools spend an average of \$400,000 pounds on computers every year.

Bundell, R. (2018). *How Schools Spend Their Money on IT*. Available at:
<https://commercial.co.uk/schoolspendingedtech/>

(p. 92) A 2015 OECD international review of the impact of computers...reports:

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(p. 92) ...the global research centre J-PAL concluded:

J-PAL Evidence Review (2019). *Will Technology Transform Education for the Better?* Cambridge, MA: Abdul Latif Jameel Poverty Action Lab, pages 2 and 11.

(p. 92) ...Larry Cuban...summed up the state-of-affairs:

Cuban, L. (2015). As quoted in Herold, B. Why ed tech is not transforming how teachers teach. *Education Week*. Available at: <https://www.edweek.org/ew/articles/2015/06/11/why-ed-tech-is-not-transforming-how.html>

(p. 92) ...I have listed 50 'negative' research studies...

Reference	Notes
Aguilar-Roca, N. M., Williams, A. E., & O'Dowd, D. K. (2012). The impact of laptop-free zones on student performance and attitudes in large lectures. <i>Computers & Education</i> , 59(4), 1300-1308.	University students who take notes using a laptop during lecture scored significantly lower than students who took notes by hand.
Alpert, W. T., Couch, K. A., & Harmon, O. R. (2016). A randomized assessment of online learning. <i>American Economic Review</i> , 106(5), 378-82.	Students who took an online course scored 5 to 10 points lower on final exam than students who took same course in a face-to-face format.
Angrist, J., & Lavy, V. (2002). New evidence on classroom computers and pupil learning. <i>The Economic Journal</i> , 112(482), 735-765.	After 8-years of using computer-aided instruction within Israeli schools, there was no discernible educational benefit.
Beland, L. P., & Murphy, R. (2016). Ill communication: technology, distraction & student performance. <i>Labour Economics</i> , 41, 61-76.	Academic performance significantly increased following the ban of cell phones in schools.
Belo, R., Ferreira, P., & Telang, R. (2013). Broadband in school: Impact on student performance. <i>Management Science</i> , 60(2), 265-282.	Increased internet use in schools (via increased broadband speeds) leads to significantly lower exam scores.
Bernard, R. M., et al. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. <i>Review of educational research</i> , 74(3), 379-439.	A meta-analysis reveals students in a synchronous online class perform worse than students in the synchronous face-to-face version of that class.
Bettinger, E. P., Fox, L., Loeb, S., & Taylor, E. S. (2017). Virtual classrooms: How online college courses affect student success. <i>American Economic Review</i> , 107(9), 2855-75.	Students in online courses perform significantly worse and show higher drop-out rates than students in the same face-to-face courses.
Campuzano, L., Dynarski, M., Agodini, R., & Rall, K. (2009). Effectiveness of Reading and Mathematics Software Products: Findings From Two Student Cohorts. NCEE 2009-4041. <i>National Center for Education Evaluation and Regional Assistance</i> .	After a year of using computer learning software, there was no discernible benefit on student learning and, in some cases, impaired learning compared to traditional methods.

<p>Carter, S. P., Greenberg, K., & Walker, M. S. (2017). The impact of computer usage on academic performance: Evidence from a randomized trial at the United States Military Academy. <i>Economics of Education Review</i>, 56, 118-132.</p>	<p>Students who use a laptop during class time (for notes and/or research) perform significantly worse than students who do not use computers.</p>
<p>Chingos, M. M., Griffiths, R. J., & Mulhern, C. (2017). Can low-cost online summer math programs improve student preparation for college-level math? Evidence from randomized experiments at three universities. <i>Journal of Research on Educational Effectiveness</i>, 10(4), 794-816.</p>	<p>Students who used a computerized program for math tutoring during summer hours did not demonstrate improved math scores the following year – regardless of number of hours used.</p>
<p>Cristia, J., Ibararán, P., Cueto, S., Santiago, A., & Severín, E. (2012). Technology and child development: Evidence from the one laptop per child program.</p>	<p>15 months of a ‘one-laptop-per-child’ intervention across 319 Peruvian schools demonstrated no discernible impact on learning or academic achievement.</p>
<p>Daraban, B. (2015). Possible Negative Consequences of Student Laptop Use in the College Classroom: An Empirical Evaluation. <i>International Information Institute (Tokyo). Information</i>, 18(8), 3439.</p>	<p>Students who use a laptop during class time (for notes and/or research) demonstrate significantly lower participation and learning than students who do not.</p>
<p>Dynarski, M., Agodini, R., Heavyside, S., Novak, T., Carey, N., Campuzano, L., ... & Emery, D. (2007). Effectiveness of reading and mathematics software products: Findings from the first student cohort.</p>	<p>After one-year of computerized math and English training, students did not show any discernible learning benefits compared to traditional teaching.</p>
<p>Ellis, Y., Daniels, B., & Jauregui, A. (2010). The effect of multitasking on the grade performance of business students. <i>Research in Higher Education Journal</i>, 8(1), 1-10.</p>	<p>Students who use a cell phone during class time demonstrate significantly worse performance on the final exam and significantly worse final grades.</p>
<p>Falck, O., Mang, C., & Woessmann, L. (2018). Virtually no effect? Different uses of classroom computers and their effect on student achievement. <i>Oxford Bulletin of Economics and Statistics</i>, 80(1), 1-38.</p>	<p>Quantitative review finds computers lead to worse ‘skills practice’ (and, consequently, learning) than traditional practice methods.</p>
<p>Figlio, D., Rush, M., & Yin, L. (2013). Is it live or is it internet? Experimental estimates of the effects of online instruction on student learning. <i>Journal of Labor Economics</i>, 31(4), 763-784.</p>	<p>Students in an online course show significantly worse learning than students in an identical face-to-face course.</p>
<p>Fox, A. B., Rosen, J., & Crawford, M. (2009). Distractions, distractions: Does instant messaging affect college students' performance on a concurrent reading comprehension task?. <i>CyberPsychology & Behavior</i>, 12(1), 51-53.</p>	<p>Instant Messaging time is negatively correlated with time-on-task and overall GPA.</p>
<p>Fried, C. B. (2008). In-class laptop use and its effects on student learning. <i>Computers & Education</i>, 50(3), 906-914.</p>	<p>Amount of laptop use in class is negatively correlated with student understanding and course performance.</p>
<p>Glass, A. L., & Kang, M. (2019). Dividing attention in the classroom reduces exam performance. <i>Educational Psychology</i>, 39(3), 395-408.</p>	<p>Students who use a laptop during class time (for notes and/or research) demonstrate significantly worse long-term retention and exam performance than students who do not.</p>
<p>Goolsbee, A., & Guryan, J. (2006). The impact of Internet subsidies in public schools. <i>The Review of Economics and Statistics</i>, 88(2), 336-347.</p>	<p>Over a 4-year period, there was a 68% increase in classrooms with internet connection across the US, but zero discernible impact on learning and academic achievement</p>
<p>Goolsbee, A., & Guryan, J. (2006). World wide wonder? Measuring the (non-) impact of Internet subsidies to public schools. <i>Education Next</i>, 6(1), 60-66.</p>	<p>Over an 8 year period, over 12 billion dollars were spent on CPU and internet subsidies across US schools, but there has been zero discernible impact on learning and academic achievement</p>

Grace-Martin, M., & Gay, G. (2001). Web browsing, mobile computing and academic performance. <i>Journal of Educational Technology & Society</i> , 4(3), 95-107.	There is a negative correlation between amount of computer usage during class and final grades.
Hembrooke, H., & Gay, G. (2003). The laptop and the lecture: The effects of multitasking in learning environments. <i>Journal of computing in higher education</i> , 15(1), 46-64.	Students who use a laptop during class time (for notes and/or research) demonstrate significantly worse memory and comprehension than students who do not.
Heppen, J. B., Sorensen, N., Allensworth, E., Walters, K., Rickles, J., Taylor, S. S., & Michelman, V. (2017). The struggle to pass algebra: Online vs. face-to-face credit recovery for at-risk urban students. <i>Journal of Research on Educational Effectiveness</i> , 10(2), 272-296.	Students in an online math recovery program struggled more and demonstrated significantly worse learning than students in an identical face-to-face recovery program.
Jacobsen, W. C., & Forste, R. (2011). The wired generation: Academic and social outcomes of electronic media use among university students. <i>Cyberpsychology, Behavior, and Social Networking</i> , 14(5), 275-280.	There is a negative correlation between the amount of computer use (both inside and outside of class) and final grades.
Junco, R. (2012). In-class multitasking and academic performance. <i>Computers in Human Behavior</i> , 28(6), 2236-2243.	Students who access social media during class perform significantly worse than students who do not.
Karjo, C. H. (2018). Comparing the effect of ICT and longhand note-taking instructions towards learners' comprehension test results. <i>Indonesian JELT</i> , 13(1), 17-30.	Students who take notes using a CPU or tablet perform significantly worse than those who use pen & paper.
Kraushaar, J. M., & Novak, D. C. (2010). Examining the affects of student multitasking with laptops during the lecture. <i>Journal of Information Systems Education</i> , 21(2), 241.	There is a significant correlation between in-class computer multitasking and academic performance. Unfortunately, students with a laptop multitask about 42% of class time.
Kuznekoff, J. H., & Titsworth, S. (2013). The impact of mobile phone usage on student learning. <i>Communication Education</i> , 62(3), 233-252.	Students who accessed a mobile phone during learning scored a full letter grade lower than students who did not.
Lau, W. W. (2017). Effects of social media usage and social media multitasking on the academic performance of university students. <i>Computers in human behavior</i> , 68, 286-291.	Social media use for learning is not correlated with performance. Social media use for non-academic purposes negatively correlated with performance.
Linden, L. L. (2008). <i>Complement or substitute?: The effect of technology on student achievement in India</i> . Working Paper, Columbia University: InfoDev.	Students in a computerized maths program showed highly significantly worse learning and performance than students in a similar face-to-face class.
Luo, L., Kiewra, K. A., Flanigan, A. E., & Peteranetz, M. S. (2018). Laptop versus longhand note taking: Effects on lecture notes and achievement. <i>Instructional Science</i> , 46(6), 947-971.	Students who took notes by computer showed impaired comprehension of concepts than students who took notes by hand.
Maxwell, N. G. (2007). From Facebook to Folsom Prison Blues: How banning laptops in the classroom made me a better law school teacher. <i>Rich. JL & Tech.</i> , 14, 1.	Banning laptops led to better engagement, student reports, and outcomes.
Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. <i>Psychological science</i> , 25(6), 1159-1168.	Students who took notes on a laptop performed significantly worse on conceptual questions than students who took notes by hand.
Muir-Herzig, R. G. (2004). Technology and its impact in the classroom. <i>Computers & Education</i> , 42(2), 111-131.	Teacher, student, and overall technology use has no significant impact on grades, performance, and attendance of at-risk students.

Pane, J. F., McCaffrey, D. F., Slaughter, M. E., Steele, J. L., & Ikemoto, G. S. (2010). An experiment to evaluate the efficacy of cognitive tutor geometry. <i>Journal of Research on Educational Effectiveness</i> , 3(3), 254-281.	Over 3-years, students who took a computerized Geometry curriculum performed nearly 20% worse than students in a traditional geometry class.
Patterson, R. W., & Patterson, R. M. (2016). The Impact of Laptop Use in the College Classroom.	Laptop use during class time decreases scores by 0.14-0.37 grade points
Patterson, R. W., & Patterson, R. M. (2017). Computers and productivity: Evidence from laptop use in the college classroom. <i>Economics of Education Review</i> , 57, 66-79.	Students induced to use computers during class (by teachers or policy) perform significantly worse than students who are induced to <i>NOT</i> use computers.
Ravizza, S. M., Hambrick, D. Z., & Fenn, K. M. (2014). Non-academic internet use in the classroom is negatively related to classroom learning regardless of intellectual ability. <i>Computers & Education</i> , 78, 109-114.	Non-academic internet use during class is negatively correlated with exam performance.
Ravizza, S. M., Uitvlugt, M. G., & Fenn, K. M. (2017). Logged in and zoned out: How laptop internet use relates to classroom learning. <i>Psychological science</i> , 28(2), 171-180.	Academic (learning relevant) internet use during class demonstrates no discernible impact on learning or performance.
Rouse, C. E., & Krueger, A. B. (2004). Putting computerized instruction to the test: a randomized evaluation of a “scientifically based” reading program. <i>Economics of Education Review</i> , 23(4), 323-338.	Students who undertook a computerized language and reading skills program show no improvement of actual language acquisition or reading skills.
Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. <i>Computers & Education</i> , 62, 24-31.	Laptop use during class negatively correlated with performance. Furthermore, students <i>within range</i> of a laptop (not using one themselves) suffered as well.
Stolarchuk, E., & Fisher, D. (2001). First years of laptops in science classrooms result in more learning about computers than science. <i>Issues in Educational Research</i> , 11(1), 25-39.	Students in a ‘computer mediated’ science classroom learn less about science than students in a more traditional science classroom.
Truman, G. E. (2005, January). An empirical assessment of student computer use behaviors in the classroom. In <i>Proceedings of the 38th Annual Hawaii International Conference on System Sciences</i> (pp. 6a-6a). IEEE.	Most students multitask when having access to a computer, and this is negatively correlated with academic performance.
Van Der Schuur, W. A., Baumgartner, S. E., Sumter, S. R., & Valkenburg, P. M. (2015). The consequences of media multitasking for youth: A review. <i>Computers in Human Behavior</i> , 53, 204-215.	Media-use during in-class and at-home learning is negatively correlated with academic performance.
Witecki, G., & Nonnecke, B. (2015). Engagement in digital lecture halls: A study of student course engagement and mobile device use during lecture. <i>Journal of Information Technology Education: Research</i> , 14(1), 73-90.	Smartphone and laptop use negatively correlated with student engagement during class time.
Woessmann, L., & Fuchs, T. (2004). Computers and student learning: Bivariate and multivariate evidence on the availability and use of computers at home and at school.	Increased access to computers at home is negatively correlated with academic achievement. Increased access to computers in school has no impact on academic achievement.
Wood, E., Zivcakova, L., Gentile, P., Archer, K., De Pasquale, D., & Nosko, A. (2012). Examining the impact of off-task multi-tasking with technology on real-time classroom learning. <i>Computers & Education</i> , 58(1), 365-374.	Students who use any form of digital technology during class time demonstrate significantly worse performance than students who do not use any digital technology.

Wurst, C., Smarkola, C., & Gaffney, M. A. (2008). Ubiquitous laptop usage in higher education: Effects on student achievement, student satisfaction, and constructivist measures in honors and traditional classrooms. <i>Computers & Education</i> , 51(4), 1766-1783.	Honours students forced to use computers during class show no GPA improvement and less satisfaction than honours students who do not use computers during class.
Yamamoto, K. (2007). Banning Laptops in the Classroom: Is it Worth the Hassles?. <i>Journal of Legal Education</i> , 57(4), 477-520.	Banning laptops during class led to significantly improved student performance.

(p. 92) ...I have also listed 50 highly-cited ‘positive’ research studies.

(Blue = Studies that show computers are merely equivalent to traditional methods

Green = Studies that do not compare computers to other methods)

Reference	Notes
Aberson, C. L., Berger, D. E., Healy, M. R., & Romero, V. L. (2002). An interactive tutorial for teaching statistical power. <i>Journal of Statistics Education</i> , 10(3).	Students who used on online statistics tutorial performed better than students who did not (no comparison to other teaching/learning methodologies).
Alpert, W. T., Couch, K. A., & Harmon, O. R. (2016). A randomized assessment of online learning. <i>American Economic Review</i> , 106(5), 378-82.	Students in a blended (part computer / part face-to-face) class performed similar to students in a pure face-to-face class.
Banerjee, A. V., Cole, S., Duflo, E., & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India. <i>The Quarterly Journal of Economics</i> , 122(3), 1235-1264.	A 2-year computerized math remediation program improved math scores similar to a face-to-face program.
Barrow, L., Markman, L., & Rouse, C. E. (2009). Technology's edge: The educational benefits of computer-aided instruction. <i>American Economic Journal: Economic Policy</i> , 1(1), 52-74.	Students who received computer aided algebra instruction performed significantly better on a final exam than students in a face-to-face class.
Bebell, D., & Kay, R. (2010). One to one computing: A summary of the quantitative results from the Berkshire wireless learning initiative. <i>Journal of Technology, Learning, and Assessment</i> , 9(2), n2.	Over 3-years on one-to-one computer use in schools led to significant student learning (no comparison to other teaching/learning methodologies).
Belland, B. R., Walker, A. E., Kim, N. J., & Lefler, M. (2017). Synthesizing results from empirical research on computer-based scaffolding in STEM education: A meta-analysis. <i>Review of Educational Research</i> , 87(2), 309-344.	Meta-analysis demonstrates computer-based scaffolding during student-led STEM significantly improves cognitive and academic outcomes (no comparison to other teaching/learning methodologies).
Bowen, W. G., Chingos, M. M., Lack, K. A., & Nygren, T. I. (2014). Interactive learning online at public universities: Evidence from a six-campus randomized trial. <i>Journal of Policy Analysis and Management</i> , 33(1), 94-111.	Students in a blended (part computer / part face-to-face) class performed similar to students in a pure face-to-face class.
Bowman, L. L., Levine, L. E., Waite, B. M., & Gendron, M. (2010). Can students really multitask? An experimental study of instant messaging while reading. <i>Computers & Education</i> , 54(4), 927-931.	Students who used Instant Messenger while reading took longer to complete the reading, but performed similar on a comprehension test as those who did not.
Carstens, B. A., Watson, T. L., & Williams, R. L. (2015). Unstructured laptop use in a highly	Students who use a laptop during class do not perform differently on a final exam than students who do not.

structured entry-level college course. <i>Scholarship of Teaching and Learning in Psychology</i> , 1(2), 137.	
Cheung, A. C., & Slavin, R. E. (2013). The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. <i>Educational research review</i> , 9, 88-113.	Use of computer assisted learning in K-12 significantly improves scores compared to traditional methods (effects are largest when used <i>in addition</i> to traditional learning).
Dunleavy, M., & Heinecke, W. F. (2007). The impact of 1: 1 laptop use on middle school math and science standardized test scores. <i>Computers in the Schools</i> , 24(3-4), 7-22.	Students in a one-to-one laptop program for 2-years performed significantly better in science than students in a traditional class (but not math).
Elliott-Dorans, L. R. (2018). To ban or not to ban? The effect of permissive versus restrictive laptop policies on student outcomes and teaching evaluations. <i>Computers & Education</i> , 126, 183-200.	Banning laptops in class had no discernible impact on learning or academic achievement compared to no-ban.
Foldnes, N. (2016). The flipped classroom and cooperative learning: Evidence from a randomised experiment. <i>Active Learning in Higher Education</i> , 17(1), 39-49.	Students in cooperative-based blended learning (part computer / part face-to-face) had significantly higher final exam scores than students in face-to-face.
Fox, A. B., Rosen, J., & Crawford, M. (2009). Distractions, distractions: Does instant messaging affect college students' performance on a concurrent reading comprehension task?. <i>CyberPsychology & Behavior</i> , 12(1), 51-53.	Students who use Instant Message while reading show no detriment in reading comprehension scores than students who do not.
Gallegos, C., & Nakashima, H. (2018). Mobile Devices: A Distraction, or a Useful Tool to Engage Nursing Students?. <i>Journal of Nursing Education</i> , 57(3), 170-173.	Students preferred laptops during class and reported improved problem solving skills, learning, and confidence (no comparison to other teaching/learning methodologies).
Grimes, D., & Warschauer, M. (2008). Learning with laptops: A multi-method case study. <i>Journal of Educational Computing Research</i> , 38(3), 305-332.	Students in a one-to-one laptop program failed to keep pace with students in traditional classes during year one, but had achieved comparable learning scores by year 2.
Gulek, J. C., & Demirtas, H. (2005). Learning with technology: The impact of laptop use on student achievement. <i>The journal of technology, learning and assessment</i> , 3(2).	Over 3-years, students in a one-to-one laptop classroom significantly outperformed students in traditional classes on measures of language, writing, math, and overall GPA.
Harrington, S. A., Bosch, M. V., Schoofs, N., Beel-Bates, C., & Anderson, K. (2015). Quantitative outcomes for nursing students in a flipped classroom. <i>Nursing Education Perspectives</i> , 36(3), 179-181.	Students in a blended (part computer / part face-to-face) class performed similar to students in a pure face-to-face class.
Heppen, J. B., Sorensen, N., Allensworth, E., Walters, K., Rickles, J., Taylor, S. S., & Michelman, V. (2017). The struggle to pass algebra: Online vs. face-to-face credit recovery for at-risk urban students. <i>Journal of Research on Educational Effectiveness</i> , 10(2), 272-296.	After 2-years of a computer-based math remediation course, students performed similar to students who took the same face-to-face course.
Hoon, T. S., Chong, T. S., & Ngah, N. A. B. (2010). Effect of an Interactive Courseware in the Learning of Matrices. <i>Journal of Educational Technology & Society</i> , 13(1), 121-132.	Students in a computer-assisted cooperative mastery learning maths program significantly outperformed students in computer-assisted cooperative and computer-assisted mastery programs (not compared to traditional teaching methods)
Hu, P. J. H., & Hui, W. (2012). Examining the role of learning engagement in technology-mediated learning and its effects on learning effectiveness and	Students who participated in an online learning program performed similarly to students in a the same face-to-face course.

satisfaction. <i>Decision support systems</i> , 53(4), 782-792.	
Joyce, T. J., Crockett, S., Jaeger, D. A., Altindag, O., & O'Connell, S. D. (2014). <i>Does classroom time matter? A randomized field experiment of hybrid and traditional lecture formats in economics</i> (No. w20006). National Bureau of Economic Research.	Students in a blended (part computer / part face-to-face) class performed statistically similar to students in a traditional face-to-face class.
Kay, R. H., & Lauricella, S. (2011). Unstructured vs. structured use of laptops in higher education. <i>Journal of Information Technology Education</i> , 10(1), 33-42.	Students with structured laptop use during class spent significantly more time-on-task than students with unstructured laptop use (no comparison to traditional methods).
Koedinger, K. R., Kim, J., Jia, J. Z., McLaughlin, E. A., & Bier, N. L. (2015, March). Learning is not a spectator sport: Doing is better than watching for learning from a MOOC. In <i>Proceedings of the second (2015) ACM conference on learning@ scale</i> (pp. 111-120). ACM.	Students who perform activities during online learning perform significantly better than students who only watch videos during online learning (no comparison to traditional methods).
Kulik, J. A., & Fletcher, J. D. (2016). Effectiveness of intelligent tutoring systems: a meta-analytic review. <i>Review of Educational Research</i> , 86(1), 42-78.	Students who receive intelligent computerized tutoring perform significantly better on tests than students who received face-to-face tutoring.
Lowther, D. L., Ross, S. M., & Morrison, G. M. (2003). When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom. <i>Educational Technology Research and Development</i> , 51(3), 23-44.	Students who had one-to-one laptops performed significantly better on writing assessments than students who shared laptops during class (no comparison to traditional teaching methods).
Ma, W., Adesope, O. O., Nesbit, J. C., & Liu, Q. (2014). Intelligent tutoring systems and learning outcomes: A meta-analysis. <i>Journal of educational psychology</i> , 106(4), 901.	Students who received personalized computerized tutoring performed similarly to students who received personalized face-to-face tutoring.
Mang, C. F., & Wardley, L. J. (2012). Effective adoption of tablets in post-secondary education: Recommendations based on a trial of iPads in university classes. <i>Journal of Information Technology Education</i> , 11(1), 301-317.	Students who used tablets to increase study time significantly outperformed students who used tablets for non-academic purposes (no comparison to traditional teaching methods).
McFarland, D., & Hamilton, D. (2005). Factors affecting student performance and satisfaction: Online versus traditional course delivery. <i>Journal of Computer Information Systems</i> , 46(2), 25-32.	Students in an online course perform similarly to students in the same face-to-face class.
Mitchell, M. J., & Fox, B. J. (2001). The effects of computer software for developing phonological awareness in low-progress readers. <i>Literacy Research and Instruction</i> , 40(4), 315-332.	Students who received 5-hours of computer-based phonological training performed similarly to students who received the same training face-to-face.
Morgan, P., & Ritter, S. (2002). An experimental study of the effects of Cognitive Tutor Algebra I on student knowledge and attitude. <i>Pittsburgh, PA: Carnegie Learning, Inc.</i>	Students who used a computerized cognitive tutor math curriculum performed significantly better on exams and final GPA than students in traditional classes.
Mouza, C. (2008). Learning with laptops: Implementation and outcomes in an urban, under-privileged school. <i>Journal of research on technology in education</i> , 40(4), 447-472.	Under-privileged students who used computers during class showed gains in learning (not compared to traditional teaching methods).
O'Dwyer, L., Russell, M., Bebell, D., & Tucker-Seeley, K. R. (2005). Examining the relationship between home and school computer use and students' English/language arts test scores. <i>The Journal of Technology, Learning and Assessment</i> , 3(3).	Review shows students who use computers to edit papers at school demonstrate higher scores than those who use computers to prepare presentations (no comparison to traditional teaching methods).

O'Dwyer, L., Russell, M., Bebell, D., & Tucker-Seeley, K. R. (2008). Examining the relationship between students' mathematics test scores and computer use at home and at school. <i>The Journal of Technology, Learning and Assessment</i> , 6(5).	Teacher and student computer use does not appear to correlate with academic outcomes.
Pane, J. F., Griffin, B. A., McCaffrey, D. F., & Karam, R. (2014). Effectiveness of cognitive tutor algebra I at scale. <i>Educational Evaluation and Policy Analysis</i> , 36(2), 127-144.	Students in a computer algebra training program for one year performed similar to students in traditional class tutoring.
Prescott Jr, W. A., Johnson, H. L., Wrobel, M. J., & Prescott, G. M. (2012). Impact of electronic device use in class on pharmacy students' academic performance. <i>American journal of pharmaceutical education</i> , 76(9), 167.	Students who used computers frequently during class performed similarly as students who did not.
Ragasa, C. Y. (2008). A comparison of computer-assisted instruction and the traditional method of teaching basic statistics. <i>Journal of Statistics Education</i> , 16(1).	Students in a computer-assisted statistics course scored significantly higher on exams than students in a traditional class.
Ritter, S., Kulikowich, J., Lei, P. W., McGuire, C. L., & Morgan, P. (2007). What evidence matters? A randomized field trial of Cognitive Tutor Algebra I. <i>Frontiers in Artificial Intelligence and Applications</i> , 162, 13.	Students who used a cognitive-tutor algebra program scored significantly higher on exams and final grades than students in a traditional class.
Roschelle, J., Feng, M., Murphy, R. F., & Mason, C. A. (2016). Online mathematics homework increases student achievement. <i>AERA Open</i> , 2(4), 2332858416673968.	Students who undertook homework using an online ASSIST program showed significantly higher end-of-year scores than students who did traditional homework.
Russell, M., Bebell, D., & Higgins, J. (2004). Laptop learning: A comparison of teaching and learning in upper elementary classrooms equipped with shared carts of laptops and permanent 1: 1 laptops. <i>Journal of Educational Computing Research</i> , 30(4), 313-330.	Students in a one-to-one laptop classroom use computers more for learning than students in a shared laptop classroom (no comparison to traditional teaching methods).
Savage, R. S., Abrami, P., Hippias, G., & Deault, L. (2009). A randomized controlled trial study of the ABRACADABRA reading intervention program in grade 1. <i>Journal of Educational Psychology</i> , 101(3), 590.	Students who undertook digital phonics training performed similarly to students who undertook traditional, small group training.
Shapley, K., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2009). Evaluation of the Texas Technology Immersion Pilot: Final Outcomes for a Four-Year Study (2004-05 to 2007-08). <i>Texas Center for Educational Research</i> .	Over a 4-year period, schools who undertook a technology immersion program performed similarly as schools that employed traditional methods.
Singh, R., Saleem, M., Pradhan, P., Heffernan, C., Heffernan, N. T., Razzaq, L., ... & Mulcahy, C. (2011, June). Feedback during web-based homework: The role of hints. In <i>International Conference on Artificial Intelligence in Education</i> (pp. 328-336). Springer, Berlin, Heidelberg.	Students who undertook computer-supported homework scored significantly higher on homework scores than students who did traditional pen/paper homework.
Sivathaasan, N., & Velampy, T. (2013). Use of electronic information resources and academic performance of university teachers: a case study. <i>European Journal of Business and Management</i> , 5(14), 46-52.	Students who have access to e-resources (reading, notes, etc.) score significantly higher on exams than students who do not.
Slomanson, W. R. (2014). Blended learning: A flipped classroom experiment. <i>Journal of Legal Education</i> , 64(1), 93-102.	Students in a blended (part computer / part face-to-face) class significantly outperform students in a traditional face-to-face class.

Stack, S. (2015). Learning Outcomes in an online vs traditional course. <i>International Journal for the Scholarship of Teaching and Learning</i> , 9(1), n1.	Students in an online course performed similarly to students in the same traditional face-to-face class.
Steenbergen-Hu, S., & Cooper, H. (2013). A meta-analysis of the effectiveness of intelligent tutoring systems on K–12 students' mathematical learning. <i>Journal of Educational Psychology</i> , 105(4), 970.	A meta-analysis shows students who employ intelligent tutoring systems performed similarly to students who employed face-to-face tutoring.
Suhr, K. A., Hernandez, D. A., Grimes, D., & Warschauer, M. (2010). Laptops and fourth grade literacy: Assisting the jump over the fourth-grade slump. <i>The Journal of Technology, Learning and Assessment</i> , 9(5).	Students who undertook one-to-one laptop language arts training for two years performed significantly better than students in a traditional class.
Wang, H., & Woodworth, K. (2011). A Randomized Controlled Trial of Two Online Mathematics Curricula. <i>Society for Research on Educational Effectiveness</i> .	Students who received extra support via digital tutoring demonstrated significantly higher test scores (no comparison to traditional methods).
Wijekumar, K. K., Meyer, B. J., & Lei, P. (2012). Large-scale randomized controlled trial with 4th graders using intelligent tutoring of the structure strategy to improve nonfiction reading comprehension. <i>Educational Technology Research and Development</i> , 60(6), 987-1013.	Students who used a computer-based language arts tutoring system score significantly higher on language scales than students in a traditional class.

(p. 93) ...recent survey exploring how over 1,500 students...most often utilize this tool...

Rideout, V. (2019). *The Common Sense Census: Media Use by Tweens and Teens*. Available at: <https://www.commonsensemedia.org/research/the-common-sense-census-media-use-by-tweens-and-teens-2019>

(p. 94) ...less than 6 minutes before accessing social media...

Rosen, L. D., Carrier, L. M., & Cheever, N. A. (2013). Facebook and texting made me do it: Media-induced task-switching while studying. *Computers in Human Behavior*, 29(3), 948-958.

(p. 94) ...students typically spend 38 minutes of every hour off-task.

Ragan, E. D., Jennings, S. R., Massey, J. D., & Doolittle, P. E. (2014). Unregulated use of laptops over time in large lecture classes. *Computers & Education*, 78, 78-86.

(p. 94) ...nearly 40% of students were unable to stop themselves from multitasking.

Wood, E., Zivcakova, L., Gentile, P., Archer, K., De Pasquale, D., & Nosko, A. (2012). Examining the impact of off-task multi-tasking with technology on real-time classroom learning. *Computers & Education*, 58(1), 365-374.

(p. 95) ...[J-PAL] goes on to state:

J-PAL Evidence Review (2019). *Will Technology Transform Education for the Better?* Cambridge, MA: Abdul Latif Jameel Poverty Action Lab, 20.

(p. 97) ...excerpt from a 2010 paper exploring the impact of 1-t-1 computer programs...

Weston, M. E., & Bain, A. (2010). The end of techno-critique: The naked truth about 1: 1 laptop initiatives and educational change. *Journal of Technology, Learning, and Assessment*, 9(6), n6.

(p. 97) ...teaching computer skills is a worthwhile goal...

Peng, G. (2017). Do computer skills affect worker employment? An empirical study from CPS surveys. *Computers in Human Behavior*, 74, 26-34.

(p. 97/98) ...the OECD goes on to state:

OECD (2015). *Students, Computers, and Learning: Making the Connection*. PISA, OECD Publishing, 3.

(p. 98) ...where Thamus (Socrates) warned...

Jowett, B. (1892). *The Dialogues of Plato in Five Volumes*. 3rd Ed. Oxford University Press, 483-484.

(p. 98) Philo T. Farnsworth...intended his tool to disseminate knowledge...

CBC Radio (2017). *The Frankenstein Factor: Inventors who Regret Their Inventions*. Available at: <https://www.cbc.ca/radio/undertheinfluence/summer-series-the-frankenstein-factor-inventors-who-regret-their-inventions-1.4026238>

(p. 98) Robert Propst...intended his easily reconfigurable office dividers...

Taube, A. (2014). The man who invented the cubicle went to his grave hating what his creation had become. Business Insider Australia. Available at: <https://www.businessinsider.com.au/cubicle-inventor-propst-hated-creation-2014-10?r=US&IR=T>

(p. 98) Alfred Nobel...intended his invention to be used only for industrial purposes...

Tägil, S. (1998). Alfred Nobel's thoughts about war and peace. *Nobelprize.org*, 20.

Andrews, E. (2020). Did a premature obituary inspire the Nobel prize? History. Available at: <https://www.history.com/news/did-a-premature-obituary-inspire-the-nobel-prize>

(p. 99) As the OECD states:

OECD (2015). *Students, Computers, and Learning: Making the Connection*. PISA, OECD Publishing, 16.

(p. 100) ...pleasure has been linked to motivation...

Reeve, J. (1989). The interest-enjoyment distinction in intrinsic motivation. *Motivation and emotion*, 13(2), 83-103.

Ainley, M., & Ainley, J. (2011). Student engagement with science in early adolescence: The contribution of enjoyment to students' continuing interest in learning about science. *Contemporary Educational Psychology*, 36(1), 4-12.

Johnson, C., & Peters Jr, R. J. (2014). Lack of enjoyment reduces the motivation to succeed in sport. *Journal of sports science & medicine*, 13(2), 454.

(p. 100) ...correlation between enjoyment and learning is surprisingly weak.

Hernik, J., & Jaworska, E. (2018). The effect of enjoyment on learning. In *Proceedings of INTED2018 Conference* (pp. 0508-0514).

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in higher education*, 47(1), 1-32.

Smith, J. K., Smith, L. F., Gilmore, A., & Jameson, M. (2012). Students' self-perception of reading ability, enjoyment of reading and reading achievement. *Learning and individual differences*, 22(2), 202-206.

Jack, B. M., & Lin, H. S. (2018). Warning! Increases in interest without enjoyment may not be trend predictive of genuine interest in learning science. *International Journal of Educational Development*, 62, 136-147.

(p. 101) Approximately 90% of schools can boast possession of a library...

U.S. Department of Education, National Center for Education Statistics. (2019). *Digest of Education Statistics, 2018* (NCES 2020-009), table 701.15.

(p. 102) ...the OECD statement quoted earlier...

OECD (2015). *Students, Computers, and Learning: Making the Connection*. PISA, OECD Publishing, 3.

(p. 103) ...fewer than 5% of enrolled students have ever completed...

Lederman, D. (2019). Why MOOCs didn't work, in 3 data points. Inside Higher Ed. Available at: <https://www.insidehighered.com/digital-learning/article/2019/01/16/study-offers-data-show-moocs-didnt-achieve-their-goals>

Reich, J., & Ruipérez-Valiente, J. A. (2019). The MOOC pivot. *Science*, 363(6423), 130-131.

(p. 103) ...completion rates are below 50%.

Lederman, D. (2019). Why MOOCs didn't work, in 3 data points. Inside Higher Ed. Available at: <https://www.insidehighered.com/digital-learning/article/2019/01/16/study-offers-data-show-moocs-didnt-achieve-their-goals>

(p. 103) ...individuals have a legitimate reason for being unable to attend live classes.

Al Lily, A. E. (2011). On line and under veil: Technology-facilitated communication and Saudi female experience within academia. *Technology in Society*, 33(1-2), 119-127.

(p. 103) ...individuals with specific learning disabilities.

Dell, A. G., Newton, D. A., & Petroff, J. G. (2012). *Assistive technology in the classroom: Enhancing the school experiences of students with disabilities*. Boston, MA: Pearson, 366.

(p. 103) ...can use computers to transcribe speech...

Stinson, M. S., Elliot, L. B., Kelly, R. R., & Liu, Y. (2009). Deaf and hard-of-hearing students' memory of lectures with speech-to-text and interpreting/note taking services. *The Journal of Special Education*, 43(1), 52-64.

(p. 103) ...can use computers to type...

Izzo, M. V., Yurick, A., & McArrell, B. (2009). Supported eText: Effects of text-to-speech on access and achievement for high school students with disabilities. *Journal of Special Education Technology*, 24(3), 9-20.

(p. 104) Airline pilots practicing mid-air emergency manoeuvres...

Page, R. L. (2000). Brief history of flight simulation. *SimTecT 2000 Proceedings*, 11-17.

(p. 104) ...surgeons practicing invasive procedures...

Khalifa, Y. M., Bogorad, D., Gibson, V., Peifer, J., & Nussbaum, J. (2006). Virtual reality in ophthalmology training. *Survey of ophthalmology*, 51(3), 259-273.

(p. 104) ...Formula One drivers practicing city-street courses...

Goode, N., Salmon, P. M., & Lenné, M. G. (2013). Simulation-based driver and vehicle crew training: applications, efficacy and future directions. *Applied ergonomics*, 44(3), 435-444.

(p. 104) ...the same cannot be said for knowledge of facts, dates, events, etc.

Codd, A. M., & Choudhury, B. (2011). Virtual reality anatomy: Is it comparable with traditional methods in the teaching of human forearm musculoskeletal anatomy?. *Anatomical sciences education*, 4(3), 119-125.

(p. 104) ...the same cannot be said for knowledge of facts, dates, events, etc.

Logothetis, A. (2019). Virtual reality the new tool for teaching Greek. *SBS Greek*. Available at: <https://www.sbs.com.au/language/english/audio/virtual-reality-the-new-tool-for-teaching-greek>

Chapter 8

Rewards

(p. 105) “No one asks how to motivate a baby...”

Skinner, B.F. (1948). *Walden Two*. Indianapolis, US: Hackett Publishing, 106-107.

(p. 105) In his book Predictably Irrational...

Ariely, D., & Jones, S. (2008). *Predictably irrational*. New York, NY: Harper Audio.

(p. 105) ...reflects on the surprising findings from one of his experiments...

Heyman, J., & Ariely, D. (2004). Effort for payment: A tale of two markets. *Psychological science*, 15(11), 787-793.

(p. 106) ...it’s actually the infamous Harvard professor B.F. Skinner.

Haggbloom, S. J., Warnick, R., Warnick, J. E., Jones, V. K., Yarbrough, G. L., Russell, T. M., ... & Monte, E. (2002). The 100 most eminent psychologists of the 20th century. *Review of General Psychology*, 6(2), 139-152.

(p. 106) A staunch adherent to the tenets of behaviourism...

Skinner, B. F. (1985). Cognitive science and behaviourism. *British Journal of psychology*, 76(3), 291-301.

(p. 106) Skinner’s most notable set of experiments involved a conditioning chamber...

Skinner, B. F. (1971). Operant conditioning. *The encyclopedia of education*, 7, 29-33.

(p. 106) ...Azrin published research in 1968...

Ayllon, T., & Azrin, N. (1968). *The token economy: A motivational system for therapy and rehabilitation*. East Norwalk, CT, US: Appleton-Century-Crofts.

(p. 106) In all 6 of Azrin’s experiments...

Levis, D.J. (1970). *Foundations of Behavioural Therapy*. New York, USA: Taylor and Francis, 77.

(p. 106) This extinction effect has since been replicated in dozens of studies...

Kazdin, A. E., & Bootzin, R. R. (1972). The token economy: An evaluative review 1. *Journal of applied behavior analysis*, 5(3), 343-372.

Kazdin, A. (Ed.). (2012). *The token economy: A review and evaluation*. Springer Science & Business Media.

(p. 107) The psychological concept of generalisation...

Encyclopedia Britannica (retrieved 2020). *Generalization*. Available at: <https://www.britannica.com/topic/generalization>

(p. 107) ...in Pavlov's famous study...whenever they heard a sound resembling a bell.

Hughes J.W. (2011) Stimulus Generalization. In: Kreutzer J.S., DeLuca J., Caplan B. (eds) *Encyclopedia of Clinical Neuropsychology*. Springer, New York, NY.

(p. 107) ...a number of educational studies dating back to the 1970s...

Kazdin, A. E., & Bootzin, R. R. (1972). The token economy: An evaluative review 1. *Journal of applied behavior analysis*, 5(3), 343-372.

Herman, S. H., & Tramontana, J. (1971). INSTRUCTIONS AND GROUP VERSUS INDIVIDUAL REINFORCEMENT IN MODIFYING DISRUPTIVE GROUP BEHAVIOR 1. *Journal of Applied Behavior Analysis*, 4(2), 113-119.

Swiezy, N. B., Matson, J. L., & Box, P. (1993). The good behavior game: A token reinforcement system for preschoolers. *Child & Family Behavior Therapy*, 14(3), 21-32.

Filcheck, H. A., & McNeil, C. B. (2004). The use of token economies in preschool classrooms: Practical and philosophical concerns. *Journal of Early and Intensive Behavior Intervention*, 1(1), 94.

(p. 107) In one such study, researchers lamented that...

Kuypers, D. S., Becker, W. C., & O'Leary, K. D. (1968). How to make a token system fail. *Exceptional Children*, 35(2), 101-109.

(p. 107) ...in 1942 researcher Leo Crespi found...

Crespi, L. P. (1942). Quantitative variation of incentive and performance in the white rat. *The American Journal of Psychology*, 55(4), 467-517.

(p. 107) ..."manifestation of some degree of frustration..."

Crespi, L. P. (1942). Quantitative variation of incentive and performance in the white rat. *The American Journal of Psychology*, 55(4), 510.

(p. 107) ...called behavioural contrast...

American Psychological Society (retrieved 2020). *Behavioural Contrast*. Available at: <https://dictionary.apa.org/behavioral-contrast>

(p. 108) ...hundreds of schools in America where financial incentives are being used...

Singer-Vine, J. (2008). When schools offer money as a motivator. *The Wall Street Journal*. Available at: <https://www.wsj.com/articles/SB121928822683759447>

(p. 108) ...the impact of paying 27,000 students to read and study...

Fryer Jr, R. G. (2011). Financial incentives and student achievement: Evidence from randomized trials. *The Quarterly Journal of Economics*, 126(4), 1755-1798.

(p. 108) ...ranging from weight loss...

Volpp, K. G., John, L. K., Troxel, A. B., Norton, L., Fassbender, J., & Loewenstein, G. (2008). Financial incentive-based approaches for weight loss: a randomized trial. *Jama*, 300(22), 2631-2637.

(p. 108) ...to anti-smoking...

Halpern, S. D., French, B., Small, D. S., Saulsgiver, K., Harhay, M. O., Audrain-McGovern, J., ... & Volpp, K. G. (2015). Randomized trial of four financial-incentive programs for smoking cessation. *N Engl J Med*, 372, 2108-2117.

(p. 108) ...coined the undermining effect.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological bulletin*, 125(6), 627.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). The undermining effect is a reality after all—Extrinsic rewards, task interest, and self-determination: Reply to Eisenberger, Pierce, and Cameron (1999) and Lepper, Henderlong, and Gingras (1999).

(p. 110) ...a related framework called organismic integration theory...

Deci, E. L., & Ryan, R. M. (1985). Toward an organismic integration theory. In *Intrinsic motivation and self-determination in human behavior* (pp. 113-148). Springer, Boston, MA.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.

(p. 112) ...the brain circuitry associated with reward-driven behaviour.

Knutson, B., Fong, G. W., Bennett, S. M., Adams, C. M., & Hommer, D. (2003). A region of mesial prefrontal cortex tracks monetarily rewarding outcomes: characterization with rapid event-related fMRI. *Neuroimage*, 18(2), 263-272.

Grabenhorst, F., & Rolls, E. T. (2011). Value, pleasure and choice in the ventral prefrontal cortex. *Trends in cognitive sciences*, 15(2), 56-67.

Liu, X., Hairston, J., Schrier, M., & Fan, J. (2011). Common and distinct networks underlying reward valence and processing stages: a meta-analysis of functional neuroimaging studies. *Neuroscience & Biobehavioral Reviews*, 35(5), 1219-1236.

(p. 112) ...processed within a student's ventromedial prefrontal cortex.

Lim, S. L., O'Doherty, J. P., & Rangel, A. (2011). The decision value computations in the vmPFC and striatum use a relative value code that is guided by visual attention. *Journal of Neuroscience*, 31(37), 13214-13223.

Smith, D. V., & Delgado, M. R. (2015). Social nudges: utility conferred from others. *nature neuroscience*, 18(6), 791-792.

Bault, N., & Rusconi, E. (2019). The art of influencing consumer choices: A reflection on recent advances in decision neuroscience. *Frontiers in Psychology*, 10.

(p. 114) ...a scarcity mindset must underpin the competitive...

Roux, C. (2014). *On the Psychological and Behavioral Consequences of Resource Scarcity* (Doctoral dissertation, Northwestern University).

Kistruck, G. M., Lount Jr, R. B., Smith, B. R., Bergman Jr, B. J., & Moss, T. W. (2016). Cooperation vs. competition: Alternative goal structures for motivating groups in a resource scarce environment. *Academy of Management Journal*, 59(4), 1174-1198.

(p. 114) ...John Hagel refers to as the Masculine/Feminine archetype...

Hagel, J. (2010). The Big Shift: Challenge and Opportunity for Women. Available at: <https://www.trendhunter.com/keynote/information-technology-keynote>

(p. 115) ...Intrinsic motivation emerges only when an activity or behaviour...

Deci, E. L., & Ryan, R. M. (2010). Intrinsic motivation. *The corsini encyclopedia of psychology*, 1-2.

(p. 115) ...intrinsic motivation can emerge with clear evidence of impact.

Valerio, K. (2012). Intrinsic motivation in the classroom. *Journal of Student Engagement: Education Matters*, 2(1), 30-35.

(p. 115) When rewards are left 'dangling' ...reduce effectiveness...

Browne, C. M., Starkey, N. J., Foster, T. M., & McEwan, J. S. (2013). Delayed reinforcement—does it affect learning. *Journal of Veterinary Behavior: Clinical Applications and Research*, 8(4), e37-e38.

(p. 116) Intermittent rewards...increase efficacy...

Ferster, C. B., & Skinner, B. F. (1957). Schedules of reinforcement.

Chapter 9

Organization

(p. 117) “Time is what we want most, but what we use worst”.

Penn, W. (retrieved 2020) Available at:
https://www.goodreads.com/author/quotes/237292.William_Penn

(p. 117) In a 1784 letter to the Journal of Paris...

Franklin, B. (1784). *To the Authors of the journal of Paris*. As reprinted in Goodman, N.G. (1931) *The Ingenious Dr. Franklin*. Philadelphia, USA: University of Pennsylvania Press, 17-22.

(p. 117) Starting April 30, 1916...

Klein, C. (2019). 8 things you may not know about daylight saving time. *History*. Available at: <https://www.history.com/news/8-things-you-may-not-know-about-daylight-saving-time>

(p. 117) ...only to be reintroduced during the global energy crisis of the 1970s.

Prerau, S. (2005). *Seize the Daylight: The Curious and Contentious Story of Daylight Saving Time*. Ney York, USA: Thunder’s Mouth Press.

(p. 117) ...daylight saving time actually increases energy consumption...

Kotchen, M. J., & Grant, L. E. (2011). Does daylight saving time save energy? Evidence from a natural experiment in Indiana. *Review of Economics and Statistics*, 93(4), 1172-1185.

(p. 118) ...the 8-hour work day was instituted to protect exploited workers...

Nation Museum of Australia (retrieved 2020). *Eight-hour Day*. Available at: <https://www.nma.gov.au/defining-moments/resources/eight-hour-day>

(p. 118) ...nearly 60% of modern work being knowledge-based...

Wolff, E. N. (2005). The growth of information workers in the US economy. *Communications of the ACM*, 48(10), 37-42.

(p. 118) ...increased productivity, efficiency, and wellbeing with 6-hour work days.

Coote, A., Franklin, J., & Simms, A. (2010). *21 hours: Why a shorter working week can help us all to flourish in the 21st century*. New Economics Foundation.

Oltermann, P. (107). Sweden sees benefits of six-hour working day in trial for care workers. *The Guardian*. Available at: <https://www.theguardian.com/world/2017/jan/04/sweden-sees-benefits-six-hour-working-day-trial-care-workers>

Pencavel, J. (2015). The productivity of working hours. *The Economic Journal*, 125(589), 2052-2076.

Graham-McLay, C. (2018). *A 4-day Workweek?* New York Times. Available at: <https://www.nytimes.com/2018/07/19/world/asia/four-day-workweek-new-zealand.html>

(p. 118) ...the 3.5 minute pop song...

McKinney, K. (2015). A hit song is usually 3 to 5 minutes long – here's why. *Vox*. Available at: <https://www.vox.com/2014/8/18/6003271/why-are-songs-3-minutes-long>

(p. 118) ...US public schooling was a year-round endeavour.

Pedersen, J. (2012). The History of School and Summer Vacation. *Journal of Inquiry and Action in Education*, 5(1), 54-62.

Butchart, J. K. (2013). *The school calendar: An examination of its past, present, and potential* (Doctoral dissertation).

(p. 119) ...the 9-month school year was an urban invention.

De Melker, S. & Weber, S. (2014). Agrarian roots? Think again. Debunking the myth of summer vacation's origin. *PBS News Hour*. Available at: [file:///C:/Users/jared/OneDrive/Desktop/Bott%20Book/9 Organization/History%20fo%20Summer%20GREAT.html](file:///C:/Users/jared/OneDrive/Desktop/Bott%20Book/9%20Organization/History%20fo%20Summer%20GREAT.html)

Pedersen, J. (2012). The History of School and Summer Vacation. *Journal of Inquiry and Action in Education*, 5(1), 54-62.

Butchart, J. K. (2013). *The school calendar: An examination of its past, present, and potential* (Doctoral dissertation).

(p. 119) ...25 to 35% of students wouldn't show up for school...

Barnard, H. (1851). *On the Need for Educational Reform*. In M. Katz (1971), *School Reform: Past and Present*. Boston, MA: Little, Brown and Company.

(p. 119) ...mandatory school attendance laws...extant in nearly all world countries...

For a list of all countries with compulsory school laws and the year each was ratified - https://en.wikipedia.org/wiki/Compulsory_education

(p. 119) ...reduced the average family vacation to only two-weeks...

Campbell, J. (2018). *How Many Vacations Does the Average Family Take?* Available at: <https://newmiddleclassdad.com/how-many-vacations-does-the-average-family-take/>

Agoda (2018). *Asian Travelers Leading the Family Travel Surge*. Available at: <https://www.agoda.com/press/family-travel-trends-2018?cid=1844104>

(p. 119) ...a phenomenon called the forgetting curve...

Ebbinghaus H (1880) Urmanuskript "Ueber das Gedächtniß". Passau: Passavia Universitätsverlag

Rubin, D. C., & Wenzel, A. E. (1996). One hundred years of forgetting: A quantitative description of retention. *Psychological review*, 103(4), 734.

Murre, J. M., & Dros, J. (2015). Replication and analysis of Ebbinghaus' forgetting curve. *PloS one*, 10(7), e0120644.

(p. 119) ...spaced repetition.

Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological bulletin*, 132(3), 354.

Benjamin, A. S., & Tullis, J. (2010). What makes distributed practice effective?. *Cognitive psychology*, 61(3), 228-247.

Carpenter, S. K., Cepeda, N. J., Rohrer, D., Kang, S. H., & Pashler, H. (2012). Using spacing to enhance diverse forms of learning: Review of recent research and implications for instruction. *Educational Psychology Review*, 24(3), 369-378.

Gerbier, E., & Toppino, T. C. (2015). The effect of distributed practice: Neuroscience, cognition, and education. *Trends in Neuroscience and Education*, 4(3), 49-59.

(p. 120) ...the ‘summer slump’...students regress about 30-days in their learning...

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of educational research*, 66(3), 227-268.

(p. 120) ...optimal recuperation is achieved by the eight day...

De Bloom, J., Geurts, S. A., & Kompier, M. A. (2013). Vacation (after-) effects on employee health and well-being, and the role of vacation activities, experiences and sleep. *Journal of Happiness Studies*, 14(2), 613-633.

(p. 120) ...student-learning...increases at the rate of about one-month per year...

Fitzpatrick, D., & Burns, J. (2019). Single-track year-round education for improving academic achievement in US K-12 schools: Results of a meta-analysis. *Campbell Systematic Reviews*, 15(3), e1053.

Moore, K., & Verstegen, D. A. (2004). The year round calendar: An analysis of student outcomes. *Educational Considerations*, 31(2), 3.

Fitzpatrick, D. (2018). Meta-Analytic Evidence for Year-Round Education's Effect on Science and Social Studies Achievement. *Middle Grades Research Journal*, 12(1).

(p. 121) ...US higher education was a miscellany of institutions...

Shedd, J. M. (2003). The history of the student credit hour. *New directions for higher education*, 2003(122), 5-12.

(p. 121) ...to apply for Harvard...

Quigley, R. (2011). This Harvard Entrance Exam from 1899 will Probably make you Feel Dumb. Available at: <https://www.themarysue.com/harvard-entrance-exam-1899/>

(p. 121) ...to apply for Iowa State...

Silva, E., White, T., & Toch, T. (2015). The Carnegie Unit: A Century-Old Standard in a Changing Education Landscape. *Carnegie Foundation for the Advancement of Teaching*.

(p. 121) ...Carnegie established a \$10 million pension fund...

Silva, E., White, T., & Toch, T. (2015). The Carnegie Unit: A Century-Old Standard in a Changing Education Landscape. *Carnegie Foundation for the Advancement of Teaching*.

Carnegie Foundatio for the Advancement of Teaching (1906). Annual Report. New York, USA: The Foundation. Available at:
<https://archive.org/details/annualreportcarn07carnuoft/page/i/mode/2up>

(p. 121) ...only students who successfully completed 24 Carnegie Units...

Silva, E., White, T., & Toch, T. (2015). The Carnegie Unit: A Century-Old Standard in a Changing Education Landscape. *Carnegie Foundation for the Advancement of Teaching*.

(p. 121) ..."improve the administration efficiency of schools and colleges...

Silva, E., White, T., & Toch, T. (2015). The Carnegie Unit: A Century-Old Standard in a Changing Education Landscape. *Carnegie Foundation for the Advancement of Teaching*.

(p. 122) ...the brain possesses a unique dual-system apparatus...

Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological review*, 89(4), 369.

Fitts, P. M. (1964). Perceptual-motor skill learning. In *Categories of human learning* (pp. 243-285). Academic Press.

Yin, H. H., & Knowlton, B. J. (2006). The role of the basal ganglia in habit formation. *Nature Reviews Neuroscience*, 7(6), 464-476.

Taylor, J. A., & Ivry, R. B. (2012). The role of strategies in motor learning. *Annals of the New York Academy of Sciences*, 1251, 1.

(p. 122) ...the brain exists in passive mode and draws energy from glucose...

Mergenthaler, P., Lindauer, U., Dienel, G. A., & Meisel, A. (2013). Sugar for the brain: the role of glucose in physiological and pathological brain function. *Trends in neurosciences*, 36(10), 587-597.

(p. 122) ...it's believed the brain draws energy from astrocytic glycogen...

Gailliot, M. T. (2008). Unlocking the energy dynamics of executive functioning: Linking executive functioning to brain glycogen. *Perspectives on Psychological Science*, 3(4), 245-263.

Christie, S. T., & Schrater, P. (2015). Cognitive cost as dynamic allocation of energetic resources. *Frontiers in neuroscience*, 9, 289.

(p. 122) ...anywhere between 30 minutes and several hours' worth of this fuel...

Christie, S. T., & Schrater, P. (2015). Cognitive cost as dynamic allocation of energetic resources. *Frontiers in neuroscience*, 9, 289.

(p. 122) ...replenished each night during sleep.

Swanson, R. A. (1992). Physiologic coupling of glial glycogen metabolism to neuronal activity in brain. *Canadian journal of physiology and pharmacology*, 70(S1), S138-S144.

Christie, S. T., & Schrater, P. (2015). Cognitive cost as dynamic allocation of energetic resources. *Frontiers in neuroscience*, 9, 289.

(p. 122/123) ...remember only 9% more than students who study for...30-minutes.

Paul, J. B. (1933). The length of class periods. *Bulletin of the American Association of University Professors (1915-1955)*, 19(4), 263-265.

(p. 123) ...the difference between longer and shorter secondary school classes...

Smythe, J. L. (1972). *The effects of class period length and frequency of meetings on biology students' understanding of the processes of science and their achievement in BSCS biology* (Doctoral dissertation), 16-30.

Parker, W. A. (1965). Establishing guidelines for effective scheduling of junior high schools with enrollments between 500-1000. 11-15. Available at:

<https://digitalcommons.cwu.edu/etd/487/>

(p. 123) Flow state...

Csikszentmihalyi, M., Abuhamdeh, S., & Nakamura, J. (1990). *Flow*. Available at: <http://www.oxbrowschool.org/assets/gallery/os36-final-projects/docs/ben-c-os36paper.pdf>

(p. 123) ...individuals become deeply absorbed in a particular task...

Jackson, S. A., & Marsh, H. W. (1996). Development and validation of a scale to measure optimal experience: The Flow State Scale. *Journal of sport and exercise psychology*, 18(1), 17-35.

(p. 123) ...engagement increases, confidence grows, and productivity soars.

Nakamura, J., & Csikszentmihalyi, M. (2009). Flow theory and research. *Handbook of positive psychology*, 195-206.

(p. 123) ...performing a task that is deeply familiar but challenging...

Engeser, S., & Rheinberg, F. (2008). Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion*, 32(3), 158-172.

(p. 123) ...undertaking a task that is intrinsically motivating...

Csikszentmihalyi, M., & Nakamura, J. (2014). The dynamics of intrinsic motivation: A study of adolescents. In *Flow and the foundations of positive psychology* (pp. 175-197). Springer, Dordrecht.

(p. 123) ...undertaking a task that is intrinsically motivating...

Csikszentmihalyi, M., & Nakamura, J. (2014). The dynamics of intrinsic motivation: A study of adolescents. In *Flow and the foundations of positive psychology* (pp. 175-197). Springer, Dordrecht.

(p. 124) ...research suggests this can improve student/teacher relationships...

Mizhquiri, L. (2019). *White Paper: The Effects of Block Scheduling and Traditional Scheduling on High School Student Achievement*. Available at: <https://digitalcommons.dartmouth.edu/educ17whitepapers/1/>

(p. 124) ...the impact of block scheduling on general learning is varied...

Gruber, C. D., & Onwuegbuzie, A. J. (2001). Effects of block scheduling on academic achievement among high school students. *The High School Journal*, 84(4), 32-42.

Mizhquiri, L. (2019). *White Paper: The Effects of Block Scheduling and Traditional Scheduling on High School Student Achievement*. Available at: <https://digitalcommons.dartmouth.edu/educ17whitepapers/1/>

(p. 124) ...some schools have embraced shorter class periods.

For example: <https://tenneyschool.com/what-is-the-real-ideal-class-length/>

(p. 125) ...sleep-based memory consolidation.

Walker, M. P., & Stickgold, R. (2004). Sleep-dependent learning and memory consolidation. *Neuron*, 44(1), 121-133.

Stickgold, R. (2005). Sleep-dependent memory consolidation. *Nature*, 437(7063), 1272.

(p. 125) Human beings have a near 24-hour circadian rhythm...

Van Gool, W. A., & Mirmiran, M. (1986). Aging and circadian rhythms. In *Progress in brain research* (Vol. 70, pp. 255-277). Elsevier.

Carley, D. W., & Farabi, S. S. (2016). Physiology of sleep. *Diabetes Spectrum*, 29(1), 5-9.

(p. 125) ...each night is typically divided into five 90-minute sleep cycles.

Patel, A. K., Reddy, V., & Araujo, J. F. (2020). Physiology, sleep stages. *StatPearls [Internet]*.

(p. 126) During stage II, the brain largely consolidates memories...

Dijk, D. J., Hayes, B., & Czeisler, C. A. (1993). Dynamics of electroencephalographic sleep spindles and slow wave activity in men: effect of sleep deprivation. *Brain research*, 626(1-2), 190-199.

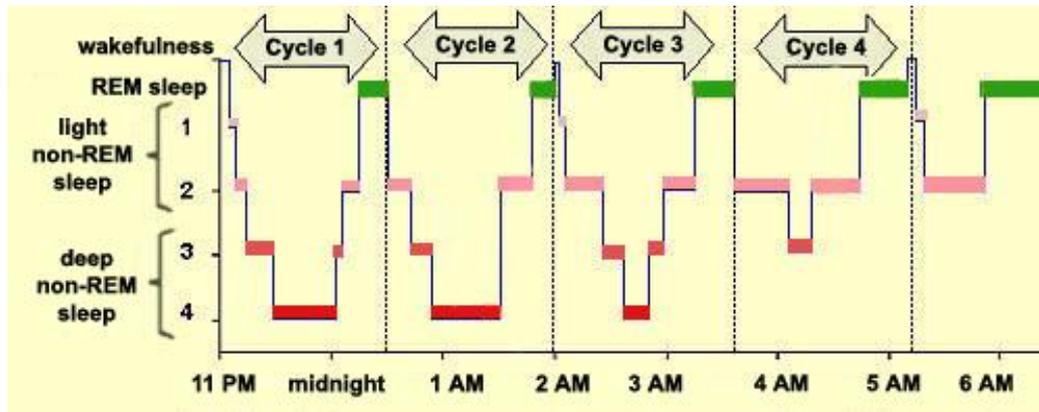
Peyrache, A., & Seibt, J. (2020). A mechanism for learning with sleep spindles. *Philosophical Transactions of the Royal Society B*, 375(1799), 20190230.

Ruch, S., Marques, O., Duss, S. B., Oppliger, D., Reber, T. P., Koenig, T., ... & Henke, K. (2012). Sleep stage II contributes to the consolidation of declarative memories. *Neuropsychologia*, 50(10), 2389-2396.

(p. 126) It's not until the fourth and fifth sleep cycles of the night...

Available at:

https://thebrain.mcgill.ca/flash/d/d_11/d_11_p/d_11_p_cyc/d_11_p_cyc.html



(p. 126) ...the circadian rhythm shifts about 2 to 3 hours later...

Louzada, F. M., Silva, A. G. T. D., Peixoto, C. A. T., & Menna-Barreto, L. (2008). The adolescence sleep phase delay: causes, consequences and possible interventions. *Sleep Science*, 1(1), 49-53.

Hagenauer, M. H., Perryman, J. I., Lee, T. M., & Carskadon, M. A. (2009). Adolescent changes in the homeostatic and circadian regulation of sleep. *Developmental neuroscience*, 31(4), 276-284.

UCLA Health (retrieved 2020). *Sleep and Teens*. Available at: <https://www.uclahealth.org/sleepcenter/sleep-and-teens>

(p. 126) ...research largely supports this notion.

Wheaton, A. G., Chapman, D. P., & Croft, J. B. (2016). School start times, sleep, behavioral, health, and academic outcomes: a review of the literature. *Journal of School Health*, 86(5), 363-381.

Keller, P. S., Gilbert, L. R., Haak, E. A., Bi, S., & Smith, O. A. (2017). Earlier school start times are associated with higher rates of behavioral problems in elementary schools. *Sleep health*, 3(2), 113-118.

Lewin, D. S., Wang, G., Chen, Y. I., Skora, E., Hoehn, J., Baylor, A., & Wang, J. (2017). Variable school start times and middle school student's sleep health and academic performance. *Journal of Adolescent Health, 61*(2), 205-211.

Chapter 10

Purpose

(p. 129) “Form [ever] follows function”.

Sullivan, L.H. (1896). *The Tall Office Building Artistically Considered*. Lippincott’s Magazine, 403-409.

(p. 129) “From within, outward”.

Cleary, R. et al. (2009). *Frank Lloyd Wright – From Within Outward*. New York, USA: Rizzoli International Publications, Inc.

(p. 131) ...public schools do not exist to serve a public...

Postman, N. (2011). *The end of education: Redefining the value of school*. Vintage, 12.

(p. 131) [A Narrative] must meet three key criteria...

Biesta, G. (2009). Good education in an age of measurement: On the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability (formerly: Journal of Personnel Evaluation in Education)*, 21(1), 33-46.

Postman, N. (2011). *The end of education: Redefining the value of school*. Vintage, 3.

(p. 132) Spearheaded largely by Thomas Jefferson...

Brackemyre, T. (2018). *Education to the Masses: The Rise of Public Education in Early America*. U.S. History Scene. Available at: <https://ushistoryscene.com/article/rise-of-public-education/>

(p. 132) ...”Public schooling is the keystone in the arch of our government”.

Smith, G.H. (2012). *Thomas Jefferson on Public Education*. Lincartarianism.org Available at: <https://www.libertarianism.org/publications/essays/excursions/thomas-jefferson-public-education-part-1>

Jefferson, T. (1813). *A Letter to John Adams*. Available at: <https://www.history.com/this-day-in-history/thomas-jefferson-writes-to-john-adams>

(p. 132) ...nearly 50% of eligible voters did not cast a ballot...

Ingraham, C. (2016). *About 100 Million People couldn't be Bothered to Vote this Year*. The Washington Post. Available at: <https://www.washingtonpost.com/news/wonk/wp/2016/11/12/about-100-million-people-couldnt-be-bothered-to-vote-this-year/>

(p. 132) ...nearly 70% of Americans cannot name any current state representative.

Haven Insights (2017). *Just 37% of Americans can Name Their Representative*. Available at: <https://www.haveninsights.com/just-37-percent-name-representative/>

Jensen-Roberts, E. (2015). *How Many People Know Their Senators?* The Boston Globe. Available at: <https://www.bostonglobe.com/magazine/2015/03/28/how-many-people-know-their-senators/yfgXyHR96X7YGhesaNQbnM/story.html>

(p. 135) ...fewer than 50% of students report feeling engaged...

Calderon, V.J. & Yu, D. (2017). Student enthusiasm falls as high school graduation nears. *Gallup News*. Available at: <https://news.gallup.com/opinion/gallup/211631/student-enthusiasm-falls-high-school-graduation-nears.aspx>

(p. 135) ...alternative schooling increases by about 5% every year.

Ray, B.D. (2020). Home-schooling: The Research. National Home Education Research Institute. Available at: <https://www.nheri.org/research-facts-on-homeschooling/>

(p. 135) ...music, exercise, and dramatic arts programs do little...

Sala, G., & Gobet, F. (2020). Cognitive and academic benefits of music training with children: A multilevel meta-analysis. Available at: <https://psyarxiv.com/7s8wr/>

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge, 53 and 143.

Fleming*, M., Merrell, C., & Tymms, P. (2004). The impact of drama on pupils' language, mathematics, and attitude in two primary schools. *Research in Drama Education*, 9(2), 177-197.

Palubinski, K. (2019). *Effects of Music Education on Academic Achievement* (Doctoral dissertation, Arizona State University).

Kohl III, H. W., & Cook, H. D. (2013). Physical activity, fitness, and physical education: Effects on academic performance. In *Educating the student body: Taking physical activity and physical education to school*. National Academies Press (US).

(p. 135) ...this relationship appears extant amongst low-income countries...

OECD (2012). *Does money buy strong performance in PISA?* PISA In Focus, 13, OECD Publishing. Available at: https://www.oecd-ilibrary.org/education/does-money-buy-strong-performance-in-pisa_5k9fhmfzc4xx-en

(p. 135) ...according to the most recent international PISA results.

Available at: <https://www.oecd.org/pisa/publications/pisa-2018-results.htm>

(p. 136) “Let us be good stewards of the earth we inherited...

Annan, K. (2001). *World Environment Day Address*. Available at: <https://www.un.org/press/en/2001/sgsm7818.doc.htm>

(p. 136) ...over 18-million hectares of land...9 thousand homes...1 billion local animals...

UN Environment Programme (2020). *Ten Impacts of the Australian Bushfires*. Available at: <https://www.unenvironment.org/news-and-stories/story/ten-impacts-australian-bushfires>

Richards, L., Brew, N., and Smith, L. (2020). *2019-2020 Australian Bushfires – Frequently asked Questions*. Available at: https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1920/Quick_Guides/AustralianBushfires

(p. 137) “If I have seen further...

Newton, I. (1675). *Letter from Sir Isaac Newton to Robert Hooke*. Available at: <https://discover.hsp.org/Record/dc-9792/>

(p. 138) “Without tools [man] is nothing...

Carlyle, T. (retrieved 2020). Available at: <https://www.goodreads.com/quotes/129420-man-is-a-tool-using-animal-without-tools-he-is>

OUTRO

(p. 141) “The task is not so much to see what no one has yet seen...

Schopenhauer, A. (1851). *Parerga und Paralipomena*. Berlin, DE: A. W. Hayn Publishing, 2(76), 93.

(p. 142) This tent...was dubbed Skunk Works.

Oxford Reference (retrieved 2020). *Skunkworks*. Available at: <https://www.oxfordreference.com/view/10.1093/oi/authority.20110803100510440>

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(p. 142/143) ...only 143-days into the project...

Lockheed Martin (retrieved 2020). *Mission Impossible: The Skunk Works Story*. Available at: <https://www.lockheedmartin.com/en-us/news/features/history/skunk-works.html>

(p. 143) ...capable of flying nearly 200 kilometres per hour faster...

Mustang Top-Speed: 703 km/h. Available at: https://en.wikipedia.org/wiki/North_American_P-51_Mustang

Spitfire Top-Speed: 594 km/h. Available at: https://en.wikipedia.org/wiki/Supermarine_Spitfire

XP-80 Top-Speed: 965 km/h. Available at: <https://www.lockheedmartin.com/en-us/news/features/history/p80.html>