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Intelligence Is Dynamic and Can Be Taught

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Abstract

There are many competing and complementary theories of intelligence. Some reviewed below are unitary, and some are multiple. Some older models argue that intelligence is strictly inherited, and there exist no means of increasing intelligence. While none of the modern theories of intelligence reviewed here explicitly argue that intelligence is strictly inherited, the author explicitly argues here that intelligence is dynamic, and can improve through education. The author cites 21 sources as evidence.

Intelligence Is Dynamic and Can Be Taught

Nearly two centuries ago, Benjamin Franklin opined, “intelligence without education is like silver in the mine” (1839, p. 22). Nearly a century later, L. L. Thurstone (1921, p. 207) asked two rhetorical questions at the conclusion of his contribution to a symposium on Intelligence: “What are the mental processes that distinguish special ability? Can these be taught to others?” Thurstone would go on to be a leader in the field of intelligence and psychometrics, and these two questions he asked in 1921 remain pertinent today.

There are many competing and complementary theories of intelligence. Some are unitary, and others are multiple. Some older models even argue that intelligence is strictly inherited, and there exist no means of increasing intelligence. While none of the below modern theories of intelligence explicitly argue that intelligence is strictly inherited, the author explicitly argues here that intelligence is dynamic, and can improve through education.

Innate Intelligence

Within the chiropractic profession remains an age old debate as to the validity of the concept of innate intelligence (Morgan, 1998). The founder of chiropractics, D. D. Palmer, based his healing methods largely on what he described as the innate intelligence of life (Keating, 2005). From the same epoch, Francis Galton, argued that intelligence depended entirely on chromosomal inheritance (Newson & Williamson, 1999). The genetics profession, similarly, continues to question to what extent intelligence is predetermined by heredity. Chorney et al. (1998) claim to have located a gene marker, or quantitative trait locus, for intelligence. Innate or intrinsic intelligence, however, is an incomplete explanation of human cognitive ability.

Fluid and Crystallized Intelligence

Horn (1988, p. 660) described fluid intelligence as abilities that reveal skills of perceiving relationships between or among stimulus patterns, and inferring implications from relationships. Crystallized Intelligence, on the other hand, Horn (1988, p. 658) described as the systematic use of acculturation to gain knowledge and sophistication from the culture. While Horn believed that crystallized intelligence was learned, and, therefore affected by education, Horn theorized that fluid intelligence was biologically determined.

Stelzl et al. (1995) later proved that both fluid and crystallized intelligence increased with education. This finding conflicted with Horn's original assumption that fluid intelligence was a natural biological neural development of the maturation process. Both fluid and crystallized intelligence, therefore, can be taught and learned according to Stelzl et al. This view of learned intelligence is more consistent with the majority of modern theories of intelligence, some of which are described below.

Triarchic Intelligence and Giftedness

Sternberg's (1983) triarchic model describes componential, experiential, and contextual dimensions to intelligence. Sternberg's model of giftedness extended these original three components of intelligence into three new categories: analytic giftedness, creative giftedness, and practical giftedness. We will examine the latter set here.

Analytical

Einstein once reflected that, “it’s not that I’m so smart, it’s just that I stay with problems longer” (Smolin, 2006, 309). Vitha et al. (2009) recommend an honors foundational course, Paths to Knowledge, as a means of enhancing analytical skills of college students. Paths to Knowledge teaches analysis through a liberal arts education based on literature and philosophy. Vitha et al. found that undergraduate students increase their analytical intelligence through the education afforded in the Paths to Knowledge coursework.

Creative

Caridad Garcia-Cepero (2008) has adapted the Enrichment Triad Model (ETM) of Dr Joseph Renzulli to increase creative intelligence in college students. Renzulli (1999) developed a program for gifted and talented education that is widely used in the United States at the elementary and secondary levels today. Renzulli found in repeated research projects of his own and others that the enrichment model increased creative intelligence across settings and populations as diverse as (a) gifted students in vocational programs, (b) underachieving students in remedial programs, and (c) students with learning disabilities in special education programs.

Practical

“How could youths better learn to live than by at once trying the experiment of living?” (Thoreau, 1893, p. 82). While studying what made a successful graduate student, Lovitts (2008) found that those students who completed doctoral theses with distinction were independent, practical, good problem-solvers, and creative (p. 319). Lovitts’ research showed that doctoral students with high practical intelligence outperformed doctoral students with high analytical

intelligence (p. 320). Graduate students with high practical intelligence even outperformed students with abundant prior relevant knowledge. Lovitts also found that graduate students improved their practical intelligence by making good use of advice from mentors such as faculty advisors (321). Practical knowledge, according to Lovitts, therefore, can increase through education.

Integrated Intelligence

In argument for an additional intelligence not listed heretofore by Gardner, Anthony (2008) defines integrated intelligence as a conscious or deliberate use of the extended mind in such a way as to allow an individual to function most successfully in a given situation (p. 233). Anthony's definition of the "extended mind" is, "the state of personal consciousness whereby individual awareness is infused with a transpersonal awareness that transcends the confines of the individual mind and the limits of the sensory organs" (p. 234). Anthony acknowledges early on in his 2008 article that his own integrated intelligence is informed by his mentors and, therefore, materially enhanced by education.

Self-Directed Learning

With the seemingly exponential growth of the internet, self-directed learning from middle school through doctoral studies, as well as professional development and personal enrichment has expanded rapidly in the last decade.

Self-directed learning is self-planned and intentional; the learner is responsible for the learning and in control of the learning (Roberson & Merriam, 2005). Artis and Harris recommend that sales managers encourage sales staff to develop self-directed learning projects

to adapt to the rapidly changing global economy markets (2007, p. 9). Artis and Harris go on to point to specific skills that sales personnel can improve in order to make the most of a chosen or given self-directed learning project (p. 13). Learners, accordingly, can increase their intelligence in specific domains through specific self-planned, and self-directed learning projects by first learning several specific self-learning skills.

Lowe and Holton describe three components of a self-directed computer-based instruction project for adults: “motivation to learn, metacognitive skills, and locus of control” (2005, p. 168). The adult learner with high motivation will, invariably, learn more and learn faster in computer-based instruction than the adult learner with low motivation (p. 168). Such a highly motivated adult learner could, therefore, improve her logical-mathematical or linguistic intelligence (Gardner, 1999) through self-directed education based on a computer. The implications for this are especially favorable for learners who have transportation, scheduling, or mobility constraints.

Conclusion

There are many theories or models of intelligence, some of which are outlined above. Importantly, there is much evidence to suggest that intelligence is improved by education in each of these models or theories. This is encouraging both to the individual learner as well as the institution of education. Although there is also evidence that there exists some biological component to intelligence, whatever the extent of this component, the biological component seems to be only a floor. “The development of intelligence is unlike physical development in that here there are no ceilings, simply the potential for endless growth” (White, 2008, p. 615).

Word Count

This article was prepared in Microsoft Word and consists of 1309 words to this point according to the word count tool of the program.

References

- Anthony, M. (2008). The Case for integrated intelligence. *World Futures: The Journal of General Evolution*, 64(4), 233-253. Retrieved August 5, 2009, doi:10.1080/02604020701413183
- Artis, A.B., and Harris, E.G. (2007). Self-directed learning and sales force performance: An integrated framework. *Journal of Personal Selling & Sales Management* 27, 9–24.
- Caridad Garcia-Cepero, M. (2008). The Enrichment Triad Model: nurturing creative-productivity among college students. *Innovations in Education & Teaching International*, 45(3), 295-302. Retrieved August 2, 2009, doi:10.1080/14703290802176238
- Chorney, M., Chorney, K., Seese, N., Owen, M., Daniels, J., McGuffin, P., et al. (1998, May). A quantitative trait locus associated with cognitive ability in children. *Psychological Science*, 9(3), 159. Retrieved August 2, 2009, from Academic Search Premier database.
- Frankllin, B. (1914). *Poor Richard's almanack*. Waterloo, Iowa: U.S.C. Publishing.
- Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st century*. New York: Basic Books.
- Horn, J. (1988). *Thinking about human abilities*. In Nesselroade, J.R., ed. & Cattell, R.B. (Eds.), *Handbook of Multivariate Experimental Psychology (2nd ed., 645–685)*. New York: Plenum Press.
- Intelligence. (2005) In *Encyclopedia of School Psychology*. Retrieved August 2, 2009, from http://www.sage-ereference.com/schoolpsychology/Article_n149.html
- Keating, J. (2005). Chiropractic history. The Palmers and the Port Perry myths. *Dynamic Chiropractic*, 23(12), 23. Retrieved August 2, 2009, from CINAHL Plus with Full Text database.
- Lovitts, B. (2008). The Transition to Independent Research: Who Makes It, Who Doesn't, and Why. *Journal of Higher Education*, 79(3), 296-325. (ERIC Document Reproduction Service No. EJ791869) Retrieved August 5, 2009, from ERIC database.

- Lowe, J.S., & Holton, E. F. (2005). A theory of effective computer-based instruction for adults. *Human Resource Development Review* 4, 159-188.
- Morgan, L. (1998). Innate intelligence: its origins and problems. *Journal of the Canadian Chiropractic Association*, 42(1), 35-41. Retrieved August 2, 2009, from CINAHL Plus with Full Text database.
- Newson, A., & Williamson, R. (1999). Should we undertake genetic research on intelligence? *Bioethics*, 13(3), 327-342. Retrieved August 2, 2009, from CINAHL Plus with Full Text database.
- Renzulli, J. (1999). What is this thing called giftedness, and how do we develop it? A twenty-five year perspective. *Journal for the Education of the Gifted*, 23(1), 3-54.
- Roberson, D. N., Jr., & Merriam, S. B. (2005). The self-directed learning process of older, rural adults. *Adult Education Quarterly* 55, 269-287.
- Smolin, L. (2006). *The trouble with physics: The rise of string theory, the fall of science and what comes next*. Boston: Houghton Mifflin Harcourt.
- Stelzl, I., Merz, F., Ehlers, T., and Remer, H. (1995). The effect of schooling on the development of fluid and crystallized intelligence: a quasi-experimental study. *Intelligence* 21, 279-296.
- Sternberg, R.J. (1983). Components of human intelligence. *Cognition* 15, 1-48.
- Thoreau, H.D. (1893). *Walden or, life in the woods*. Boston: Houghton Mifflin.
- Thurstone, L. (1921). Intelligence and its measurement: A symposium--X. *Journal of Educational Psychology*, 12(4), 201-207. Retrieved August 2, 2009, doi:10.1037/h0064912
- Vitha, M., Sanders, A., Cairns, C., Skidmore, D., Elliott, C., & Lewis, W. (2009, June). Paths to Knowledge as a Foundational Course in an Honors Program. *Honors in Practice*, 5, 135-152. Retrieved August 3, 2009, from Education Research Complete database.
- White, J. (2008). Illusory Intelligences? *Journal of Philosophy of Education*, 42(3), 611-630. Retrieved August 5, 2009, doi:10.1111/j.1467-9752.2008.00643.x