

A Paper on Instructional Design Theorist, Roger Schank
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Abstract

This paper briefly explores Roger Schank as man, computer scientist, published writer, artificial intelligence (AI) visionary, and learning theorist. It highlights important events and discoveries in his life, education, career, and research. His strong virtual presence is mostly due to the online curricula he has developed, made lighter by personal videos of his young grandsons. He is best known for founding Socrates Arts and creating simulation-based learning materials, which he believes to be better means of instruction compared to traditional approaches. One of his best research projects focused on making computers think, remember, and experience like humans.

Roger Schank – Personal Life/Biography

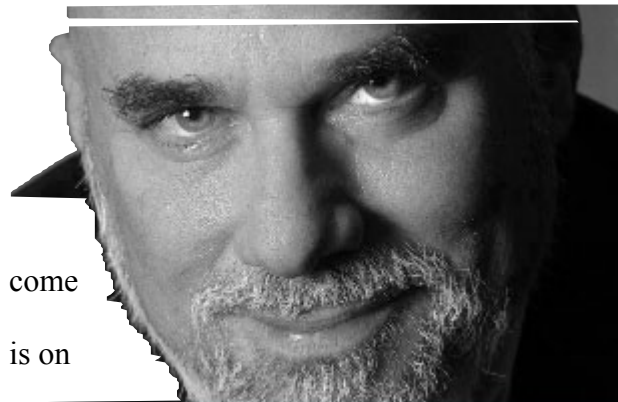


Figure 1: Photo of Roger Schank (Schank, 2009)

Roger Schank is a leading visionary in artificial intelligence and learning theory (Biography Page, 2016). The latter may have come as a surprise given the fact that his initial focus is on computer science, but his interests in education do revolve around the non-traditional, more technologically-savvy approaches. These

approaches, of course, make use of his knowledge in computers as well as his belief that

education must encompass concepts that will be used in real life and not just in the classroom.

He believes that the traditional curricula are founded in elitist notions of what should be learned at school and that what is being taught in schools are now increasingly losing their relevance.

As CEO of Socrates Arts, Schank fosters the implementation of such methods, of which learning-by-doing, and story-centered curricula are examples. Schank is interested in not just helping people learn, but also in helping computers learn through humanlike experiences and failures, in order for them to be able to better support the learning of humans. One of Schank's motivations in exploring these theories is his belief that the teaching strategies in schools need saving.

Born Roger Carl Schank in 1946, he currently lives in Florida where he spends time relaxing and bonding with his children and his grandchildren. His grandchildren are already

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enjoying their own brand of virtual fame, through their YouTube videos. His grandson Max not only stars in typical Internet child videos as one would expect, but already participates in informing people about learning through his videos. Meanwhile, the younger Milo provides the cute factor in the Grandparent Games.

Schank makes the most of his time in Florida to revitalize himself for when he does have to speak or teach about any of his fields of expertise in other parts of the United States or even of the world. Ironically, though a lecturer, he does not believe that anyone learns anything long-term when listening to lectures, but he acknowledges the feeling of “being the smartest in the room” when lecturing. (Schank R. , 2016). He wears many hats as educational reformer/learning scientist, cognitive psychologist, artificial intelligence theorist, and entrepreneur, but he apparently has a strong passion for learning and teaching.

Education and Academic Career

Roger Schank has enjoyed faculty positions at both Stanford University and Yale University. At Stanford, as an Assistant Professor in the early seventies, he had become famous for being the first person to “get computers to...process typewritten everyday English language sentences. (Education , 2016)” It was not just a simple program. It was a turning point not just in computers, but also in the field of psychology because the studies that resulted from it focused on how people infer from the things that they hear.

He moved to Yale in 1974, serving as a professor in computer science, as well as in psychology. In the same university, he was promoted to Chairman of Computer Science in 1981. He was also given the role of Yale Artificial Intelligence Project director. There, he continued working on furthering his early discoveries. Specifically, he programmed an application that will read a newspaper story and analyze it to predict results out of it. Due to the study’s implications on security and conflict prediction, Schank’s research was funded by no less than the US Department of Defense.

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Computers may be faster in terms of processing, but Schank recognized their weakness in terms of having humanlike memory and experiences. The educational reformist believes that one must be able to learn from experiences, especially from mistakes. He also has to feed computers information that will help them tie sentences together, with the help of a concept that he proposed. The concept is called “scripts”.

“For our purposes, a script is a predetermined, stereotyped sequence of actions that define a well-known situation. (Schank & Abelson, 1977)” So, the meaning of a script is close enough to what one would normally associate the word “scripted” with. When one thing is called scripted, it is boring and expected, and according to Schank and Abelson, “predetermined”. The sequence of events goes as it would normally do, therefore making predictions a lot easier. It is in the mix of scripts or in the addition of the absurd that things become a lot more interesting. Scripts may also say a lot about what people, and how they react. “Schank had discovered something important about people even though he was working in computer science” (Education, 2016).

Through his research, Roger Schank realized that he could apply what he is working on to learning. Computers have to be reminded about what they have already learned before. They should also be fed new knowledge, and react accordingly when there is a mistake. People learn the same way. They follow a certain series of scripts and then they would stop to ponder and reflect whenever the results do not meet their initial expectation. However, the current education that Schank was pondering about – the same one in which his children are immersed in – did not please him at all. Due to the new links between his research and learning, Schank sought funding for the development of a computer curriculum, which he believed would solve the problem in the education field.

Schank was given funding by Andersen Consulting in 1989, but with the condition that he would train the company’s employees. The AI innovator was happy enough to apply his

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theories in learning through adult learning, in the training of Andersen's employees. He was later granted a chaired professorship at Northwestern University. This is where he was able to establish the Institute for the Learning Sciences (ILS). The institute enjoyed the service and support of almost 200 employees. It also gathered a lot of government sponsors, which included the National Guard and the Army, among others. Corporate sponsors included powerhouses, such as IBM. The approach to instruction used in the ILS's learning is through various types of appropriate simulation, for example handling Andersen's virtual employees played by actors. Schank, however, had problems translating his ILS research to the real school setting, there was little funding left. He had to come up with a cheaper version of his previously created educational model. The new model was called the Story Centered Curriculum (SCC).

In 2001, Schank focused on his Computer Science roots by being Carnegie Mellon's Chief Education Officer in the school's new campus in Silicon Valley. The school offered Masters Degrees in Computer Science. The approach popularly used for instruction is through problem based learning (PBL) in teams.

The following year, Schank founded Socratic Arts. Socratic Arts produces curricula for various purposes: for schools, organizations, and businesses. It even targets primary and secondary schools.

In 2008, Schank helped develop online masters' degrees making use of experiential approach, together with Barcelona's La Salle University. Four years later, he launched the related experiential teaching online (XTOL), as designed by Socratic Arts. Outside investors are funding the development and research. The online programs are initially limited to business and computer science offerings, but are planned to expand to other fields.

Today, Roger Carl Schank is still working in Artificial Intelligence. He has published books on how he believes he could change how people learn in schools today. He provides services to different sectors, such as business, computer science, military, and education.

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Research

Much of the theory that Schank explored in research dealt with how people and computers learn, often together. Even his primary academic background is in artificial intelligence. Therefore, he remained mostly within the same circles, and yet was able to do a lot out of it. His research also had an entrepreneurial spirit, spawning lucrative projects and academic strategies.

One of the most vital pieces of research attributed to Roger C. Schank is the use of script in predicting human behavior. He has discovered that humans, as well as computers, will more likely produce results that follow a certain predictable sequence of events, otherwise known as a script. He explored much of what he has learned in the book, "Scripts, plans, goals, and understanding: An inquiry into human knowledge structures."

Schank has also taught computers to read newspapers. This is where he realized that computers, while faster and seemingly more sophisticated, cannot remember in the same way that humans could. Computers could end up reading the same lines of news and would not recognize that they have already done so before. They may be able to store tons of information, but they could not really learn. "Schank began to realize that understanding and memory and the ability to generalize were all really the same thing" (Education , 2016). This realization has made him think of ways to improve teaching in schools. He was not particularly happy about the state of education in traditional schools.

Through the computers' lack of learning in terms of combining memory and understanding, Schank has concluded that humans must be taught and reminded, and must learn from failure. The computer is, on the surface, perfect. It can store so much information at any

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given time. One must only know how to retrieve the information. The computer, however, has to be reminded about past information that it has read. It also must be able to know how to handle failure, built as it was to just follow a set of clear instructions. People and computers are designed to expect a certain set of results. When the result serves a failure to that expectation, a person can wonder why. A computer should be able to wonder why. When there is that active wonder present, learning happens.

The research becomes more specific after Stanford University psychologists pointed out the problem that when two memories have similar details, they could end up becoming confused with each other. Schank ended up tweaking his theory, making the events smaller in scope. The smaller packages of expectations were named as Memory Organization Packages (Schank R. C., *Dynamic Memory: A Theory of Learning in Computers and People*, 1982).

Schank's multiple interests in computer science, education, entrepreneurship, and memory all collided together, albeit ultimately harmoniously, in his work with Andersen Consulting. His knowledge became tested in adult learning. They used simulation in training 200 employees.

It wasn't until Schank moved to Northwestern University, however, that he was able to apply the fruits of his research labor to actual education. It was through this move that the Institute of Learning Sciences was born. As mentioned earlier, the mode of instruction was through simulation. Different learning scenarios had been put to a test, using the chosen approach to instruction. Schank later came up with a cheaper educational model, known as Story Centered Curriculum (SCC). Again, the name used for the program is suggestive of something creative – story or script related educational strategies. Schank, after all, believes that knowledge is best imparted through experiences and through mistakes.

The simulation approach that Schank was using made it into the development of online-based curricula. The SCC has, so far, embodied the simulated lives of e-commerce consultants

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and software engineers. Real e-commerce consultants and software engineers serve as experts that provide the needed simulation of online business and computer science students. Learning is done through projects. It is in 2002 that Schank had officially founded a virtual place where such learning can continue to take place and develop, through the Socrates Art Company, of which he is the CEO. One could say that Roger Carl Schank's research ventures always find a practical venue, both entrepreneurial and academic. Consistent to his beliefs that learning is best done through experience; his theories do not remain mere theories either.

Publications and/or books

- Schank, R. (1973). Conceptualizations underlying natural language. In *Computer Models of Thought and Language*, R. Schank & K. Colby, eds. San Francisco: W.H. Freeman.
- Schank, R. & Abelson, R.A. (1977). *Scripts, plans, goals and understanding: An inquiry into human knowledge structures*, Erlbaum.
- Schank, R. (1982). *Dynamic Memory: A Theory of Learning in Computers and People*. New York: Cambridge University Press.
- Schank, R. (1984). *The Cognitive Computer: On Language, Learning and Artificial Intelligence*. Reading: Addison Wesley.
- Schank, R. (1990). *Tell Me A Story: A new look at real and artificial memory*. Scribner's.
- Schank, R. (1991). *The Connoisseur's Guide to the Mind: How we think, How we learn, and what it means to be intelligent*. Summit Books.
- Schank, R. & Cleary, C. (1995). *Engines for Education*. Hillsdale, NJ: Lawrence Erlbaum.
- Schank, R. & Morson, G.S. (1995). *Tell Me A Story: Narrative and Intelligence*. Northwestern University Press.
- Schank, R. & Childers P. (1998). *The Creative Attitude: Learning to Ask and Answer the Right Questions*. MacMillan Publishing Company.
- Schank, R. (1999). *Dynamic Memory Revisited*, 2nd Edition. New York: Cambridge University Press.
- Schank, R. (2000). *Coloring Outside the Lines: Raising A Smarter Kid by Breaking All the Rules*. New York: Harper.

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- Schank, R. (2001). *Scrooge Meets Dick and Jane*. Mahwah: Lawrence Erlbaum.
- Schank, R. (2004). *Making Minds Less Well Educated, 1st Edition*. London. Routledge.
- Schank, R. (2005). *Lessons in Learning, e-Learning, and Training: Perspectives and Guidance for the Enlightened Trainer*. Pfeiffer.
- Schank, R. & Lyras, D. & Soloway, E. (2010). *The Future of Decision Making: How Revolutionary Software Can Improve the Ability to Decide*. New York: Palgrave Macmillan.
- Schank, R. (2011). *Teaching Minds: How Cognitive Science Can Save Our Schools*. New York: Teacher's College Press.
- Schank, R. (2015). *Making School Meaningful and Fun! (Solutions for Modern Learning)*. Bloomington: Solution Tree Press.

References

Artificial Intelligence. (2016, February 20). Retrieved from Roger Schank Official Website: <http://www.rogerschank.com/artificialintelligence.html>

Biography Page. (2016, February 20). Retrieved from Roger Schank Official Website: <http://www.rogerschank.com/biography.html>

Education . (2016, February 20). Retrieved from Roger Schank Official Website: <http://www.rogerschank.com/education.html>

Schank, R. (2016). *Education Outrage*. Constructing Modern Knowledge Press.

Schank, R. C. (1982). *Dynamic Memory: A Theory of Learning in Computers and People*. New York: Cambridge University Press.

Schank, R. C. (1999). *Dynamic Memory Revisited, 2nd Edition* . New York: Cambridge University Press.

Schank, R. C. (2004). *Making Minds Less Well Educated*. London: Routledge.

Schank, R. C. (2011). *Teaching Minds: How Cognitive Science Can Save Our Schools*. New York: Teacher's College Press.

Schank, R. C. (2013). *Scripts, Plans, Goals, and Understanding: An Inquiry Into Human Knowledge Structures (Artificial Intelligence Series)*. Abingdon: Psychology Press.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, Plans, Goals and Understanding*. Erlbaum.

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Reflection

Approaches to instruction must evolve, just as the world has evolved and continues to do so. It should not favor education as it was acceptable decades ago. Though I like learning things that others do not deem practical, such as advanced mathematics, I understand the pragmatism that Roger C. Schank applies to his methods. His displeasure in the way his children is being taught propels him to dive further into his research. One could say that experience certainly taught him something. He is certainly right about that.

Knowing more about the educational reformist made me see that it is possible to have a clear connection between story-telling and computer science. Both make use of scripts and both have set expectations. Humans, however, are not robots or computers. Learning is absorbed more deeply when there is an experience, especially a mistake, attached to the event. It is also facilitated better when there is a practical use for it. While these thoughts may seem like the usual advice that people already inherently know about, Schank's books prove readers wrong. He is able to back up his opinions with tangible information, including educational history and computer science know-how.

It has been a great experience delving into the life of an educational reformist and computer scientist because my background, though a lot humbler, is a little similar, with programming, numbers, words, and the academe as ingredients, although I lack the psychology and entrepreneurship parts. Schank is versatile enough to make use of various approaches to instruction: simulation, experiential, and problem-based, and it is obvious that he leans towards the less than traditional. These options are exciting that I wonder if I can ever implement them in a makeshift way in my computer-free, second grade classroom.