

Connectivism: a new learning theory?

Datum 11/11/2006 **Bijdrage van** Pløn Verhagen (University of Twente)

George Siemens may be one of the most controversial speakers on many e-learning conferences, including the SURF Onderwijsdagen in mid November. In his article "Connectivism: A Learning Theory for the Digital Age" from 2004 Siemens denounces the limitations of behaviourism, cognitivism, and constructivism and introduces connectivism as a learning theory for the digital era. Pløn Verhagen, professor Educational Design at the University of Twente shares his opinions on connectivism at the request of the E-learning theme site.

See also the [reaction of George Siemens](#) on his weblog, and the [reaction of Stephen Downes](#).

A pedagogical view, not a learning theory

George Siemens claims in his 2004 article "[Connectivism: A Learning Theory for the Digital Age](#)" that the connectivism that he proposes is a learning theory. A learning theory which he characterises as the "amplification of learning, knowledge and understanding through the extension of a personal network". He uses the example of senior citizens that have been linked as mentors to elementary school pupils as a striking example. However, this is not a learning theory, but a pedagogical view on education with the apparent underlying philosophy that pupils from an early age need to create connections with the world beyond the school in order to develop the networking skills that will allow them to manage their knowledge effectively and efficiently in the information society. What knowledge the pupils need to have and what knowledge can remain distributed elsewhere or should be developed elsewhere is an issue which the pupils themselves have an active voice in.

The questions that Siemens presents are not to be placed at the instructional level, but at the level of the curriculum. The instructional level deals with *how* learning takes place, and learning theories are relevant at that level. The level of the curriculum is concerned with *what* is learned and *why*. At that level Siemens' connectivism represents his views on a structured development of knowledge that fits the current times and the kind of information skills that pupils should acquire for this. Siemens finds shortcomings in the learning theories that are focussed on the learning processes of the individual. In this Siemens makes a mistake because he finds fault at the curriculum level with theories that do not belong at that level.

The core notion of connectivism appears to be that the learning process must create interconnections for knowledge that is distributed over many actual and virtual locations.

Maintaining these connections then becomes a learning skill that is essential for life-long learning in a technological information society. The eight principles of connectivism that Siemens then defines can be subsumed in four categories:

- Educational aims for the curriculum (“Capacity to know more is more critical than what is currently known”; “Ability to see connections between fields, ideas, and concepts is a core skill”);
- Premises for the curriculum (“Learning and knowledge rests in diversity of opinions” [which does not quite clarify what is actually intended by this]; “Currency [accurate, up-to-date knowledge] is the intent of all connectivist learning activities”; “Nurturing and maintaining connections is needed to facilitate continual learning”);
- Learning processes that are to be facilitated when putting a curriculum into practice (“Learning is a process of connecting specialized nodes or information sources”; “Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision”);
- And as a separate category: “Learning may reside in non-human appliances”.

The first three categories in combination appear to confirm the notion that connectivism is a pedagogical view. The elements mentioned have often been presented and are not at all new, apart from a choice of words that focuses on connectivism. This raises the question why in this combination they should justify the introduction of a new approach. The arguments in the article consist of posing questions regarding the influence of technology and chaos and network theory on learning, followed by listing some characteristics and properties of these developments. And the presentation of connectivism as the integration of principles that are explored by chaos, network and complexity theories and theories on self-organisation. The principles mentioned above are subsequently introduced.

A theory should explain phenomena and those explanations should be verifiable. The information presented here is not sufficiently specific and coherent to allow any comments on that aspect. The principles are not sufficiently linked to the arguments and examples to develop an idea of how the theory could function in practice. An example will make this clear. Siemens’ article includes the following passage:

“Landauer and Dumais (1997) explore the phenomenon that ‘people have much more knowledge than appears to be present in the information to which they have been

exposed'. They provide a connectivist focus in stating 'the simple notion that some domains of knowledge contain vast numbers of weak interrelations that, if properly exploited, can greatly amplify learning by a process of inference'. The value of pattern recognition and connecting our own 'small worlds of knowledge' are apparent in the exponential impact provided to our personal learning."

Firstly we should note that it is Siemens who states that Landauer and Dumais present a connectivist focus. Landauer and Dumais probably have never heard of connectivism. However, if we follow Siemens' reasoning, we could argue that identifying the weak links between the knowledge from a diversity of domains could be a possible aim for connectivism which we could refer to as "cross-disciplinary analysis to arrive at hidden synergies".

But in the case of his other examples other options are possible through such associations. Uncertainty remains about what is the actual identity of connectivism.

Learning people and learning objects

The principle that "learning may reside in non-human appliances" appears to have a special significance for Siemens. In his article he returns to this subject several times to argue the shortcomings of existing learning theories. Taken literally, this principle refers to objects that learn. Siemens defines learning as "actionable knowledge" that "can reside outside of ourselves (within an organization or a database)". This is a remarkable definition because learning is not defined as a process but as a result. If we adopt this definition of learning, then the observation that this knowledge can reside in a database or organisation is trivial. In another principle he refers to learning as a process of creating links between information elements. In that case learning could still reside in non-human appliances. This would refer to software systems that modify input into new information. Such systems exist in various shapes and sizes. The system that manages my Amazon account and maintains a profile of my interests based on the books that I buy is such a learning system and is also an example of a system that "reasons independently" (based on the algorithms that were put into it). Siemens probably is thinking of much more complex systems when he presents connectivism as "the integration of principles explored by chaos, network, and complexity and self-organization theories". In areas where such theories are relevant, such as "machine learning", "inductive learning" and "fuzzy logic" software is being developed for advanced reasoning machines and experiments are being conducted with those systems. These have nothing to do with human learning, except that they can take over some cognitive tasks from people when generating knowledge. In principle this is hardly more remarkable than using a pocket calculator to avoid the tiresome task of doing sums by hand, or using statistical software to analyse experimental data that cannot usually be processed by hand because of its volume alone.

I suspect that Siemens assigns so much significance to the principle of the non-human appliances because it is his vision that in a society where information technology is everywhere learning will soon take place in a continuous interaction with information systems and in which the learner consciously decides which cognitive tasks he undertakes himself and which ones he delegates to a software system. And in such a way that he integrates the knowledge stored within the system with the knowledge he has in his brain into a single whole which the learner considers to be his own knowledge.

I admit that this is speculation, but I cannot imagine what other purpose Siemens has in mind with this principle. In any case I think he is just mistaken. To me, the essence of this principle is using knowledge that you do not have at the ready, whose existence and usefulness you are aware of and to which you also have access. That, of course, is nothing special and is unrelated to the question whether that knowledge is stored in non-human appliances. Throughout history groups have functioned according to this principle in all manner of social and organisational structures, using a division of tasks and a distribution of knowledge. The architect heading a construction process links up with his own knowledge the knowledge of masons, carpenters, electricians and many others in a way that allows him to state: "I built that house." For this purpose, an important part of his knowledge consists of what all those people know, of all their skills and of the knowledge that they develop for the purpose of the construction project, at his direction or otherwise. In principle there is no difference if possibly a part of that knowledge were to reside in a "non-human appliance" or was generated by it. In this manner he even appropriates the knowledge that is necessary to produce the bricks that he uses. After all, that knowledge is stored as added value in the properties of the bricks and he selects the bricks for those properties. No one will look at those bricks that way, but thinking along with Siemens we could use connectivist terms to describe it that way. And also arrive at another option for what connectivism actually represents.

Using knowledge that is stored in "non-human appliances" has been done through the ages. Memory limitations have been compensated by writing things down, printing books and creating databases. Modern cognitive tools are nothing but an extension of the toolkit. Fast technological developments do indeed result in a fast increase of advanced supportive systems and an increase in the scale of communication logistics that affects our thoughts and acts. The corresponding problems are researched by a number of disciplines. Earlier I mentioned a few in relation to the technology or reasoning systems. In the area of their application one not only finds educational issues and issues in the field of information management. The networked society is also studied from the perspective of economy, psychology, sociology, anthropology, politics and philosophy. The place to which connectivism should be assigned next to this or as part of this can only be clarified if what connectivism offers becomes more specific and can be placed with a thorough knowledge of the scientific content of the relevant disciplines. For this, we find no clues in Siemens article. For instance, he does not include an argument to support his claim that

connectivism is an integration of chaos, network, complexity and organisation theory nor a reasoned synthesis of elements of those theories into the theory of all-inclusive connectivism.

Lacking that, what is left for us to do is 'unsubstantiated philosophising', preferably over a glass of wine before dinner. Perhaps someone can come up with a cunning plan; otherwise I think that we should forget about connectivism.

Do you share Plon Verhagens vision on connectivism? We invite you to comment on his vision, and to share your own vision with other readers. Click [here](#) to add your comment.

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