The Importance and Application of Technology in Connectivist Course Design

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Abstract

The purpose of this paper is to explore the concept of Web 1.0, 2.0 & 3.0 technologies and discuss their application in a connectivist online course design. Common learner challenges in connectivist course environments relating to the use of such technologies will also be discussed along with ideas for how they might be mitigated. In the process, Mackness, Mak & Williams' (2010, p. 272) call for moderating connectivism to ensure effective learning will be answered and the importance of pedagogical purity versus pragmatism will be debated.

Keywords: Connectivism, Siemens, Downes, MOOC

Web 1.0

Web 1.0 is often referred to as the informational web. Connectivism espouses that the widespread adoption of the World Wide Web in the early '90s fundamentally changed what was worth learning (Siemens, 2005a, p. 5). Prior to the advent of the web, a state of informational scarcity existed (Weller, 2011, p. 5). But the web made publicly available a vast body of knowledge and expertise to anyone with an Internet device. In short, the advent of the web democratized knowledge (Lemke & Coughlin, 2009, p.54).

Search Engines

A common refrain in the web era is "Why do we have to learn this, if we can just Google the answer?" Connectivism concurs. Knowing how to access information from "the network" is more important than what we store in our brains (Siemens, 2005a, p.3). As Siemens asserts "The pipe has become more important than the content within the pipe" (p. 5).

As such, connectivism asserts that navigating the "network" to obtain desired information (and then discern its value and legitimacy) is a crucial digital era skill (Siemens, 2005a, p.3). The self-directed usage of search engines to obtain information and build out a personal body of knowledge remains central to the connectivist pedagogy.

Web 2.0

While the emergence of Web 1.0 technologies may have changed what was worth learning, it was the arrival of Web 2.0 that changed how we learned (Siemens, 2005a, p.3). Web 2.0 is often associated with the shift from text and simple graphics to multimedia. But in reality, the defining shift was from one-way communication to mutual creation and conversation. Or as Siemens puts it, "the reshaping of learning as a two way process" (2005b, p. 26). As such, web

2.0 is often referred to as the read-write web or alternately the interactive or social web (Weller, 2011, p. 6).

It is only with the emergence of web 2.0 technologies like social networking, social bookmarking, blogging, micro-blogging, cloud applications, RSS feeds and content curation that the key activities associated with a connectivist pedagogical experience can truly occur. Per Kop, Fournier & Mak (2011, p. 79), these are aggregation, remixing, repurposing and feeding forward. These core connectivist learning activities and their associated use of educational technologies are discussed below.

Key Connectivist Activity #1: Aggregation

In the traditional, instructivist model of higher education, the instructor identifies what is important to be learned relative to a particular subject and places such resources in a learning management system for learners to access. Typically access to these resources is "closed", limited to course participants (and the duration of the course).

Connectivism believes such an approach and such systems are remnants of our informational scarcity past (Kop, Fournier & Mak, 2011, p. 75). Connectivism advocates that all learners should be active and equal participants in identifying and creating the relevant body of knowledge by mining the pipe. In the connectivist conception, all learners, including the instructor, represent equally important (or arguably unimportant) nodes in the much broader informational network. (Anderson & Dron, 2011, p.88).

Hash tags and RSS.

A common strategy employed by connectivist-influenced courses such as the MOOCs moderated by Siemens and Downes in 2008 (Mackness, Mak & Williams, 2010, p. 266) and 2011 (Kop, Fournier & Mak, 2011, p. 74) regarding personal learning environments and

connectivism is the combination of course specific hash tags and RSS aggregation tools to generate course resources.

Let's say I am participating in a MOOC called Edutainment 2014. Learners might be instructed to utilize the hash tag #edutainment2014. So if I encounter a relevant network resource (article, video, podcast, website, blog post, etc.), I would reference said resource in a social media communication of some sort (such as a tweet or blog post).

Then an RSS aggregation tool would be leveraged to cull those hash tag identified resources into a central environment. For example, eduMOOC 2011 utilized Paper.li to publish a daily newspaper of relevant course content (Venable, 2011). Paper.li is unique relative to other RSS aggregators such as a Storify or Flipboard in that it is not "evergreen". Content is limited to what has been "socially published" on the topic in the last 24 hours, mimicking a real newspaper.

In a course with hundreds or thousands of participants, the outlined approach can create an overwhelming amount of content even when viewed on a daily basis. Just as one would not read every article in a newspaper or every entry on a search engine page, the expectation is not to consume everything. But it is upon the learner to determine ultimately what to consume.

While this results in some course participants feeling overwhelmed (Dron & Anderson, 2009 & Hall, 2008 as cited by Anderson & Dron, 2011, p.7), connectivism argues that managing the vast chaos that is the network is a vital digital era competency (Siemens, 2005a, p.3). This raises an interesting debate relative to designing connectivist courses. What should take precedence: theoretical purity or learner satisfaction? Informational chaos is a fact of life, but if its existence in a course environment drives learners away then that is problematic. This will be furthered explored shortly.

Social bookmarking.

Connectivism further advocates that learners personally aggregate the learning resources they do choose to consume. While this might be accomplished via a simple recording of links, social bookmarking tools are a preferable connectivist technology for several reasons. The first is that it allows for learner driven organization of resources. This organization may take the form of tagging (e.g., Diigo) or physical grouping (e.g., Symbaloo). A web 2.0 resource like Pearltrees takes the grouping process one step further by allowing learners to leverage branch like structures to establish connections between resources that can be altered as a learner's understanding of a topic evolves.

Connectivism believes that learning is associated with the act of discerning the patterns or relationships that exist between information. Siemens asserts that the informational network is a chaotic place, not because of the lack of connection between information (or cause and effect), but rather because of the abundance of connection (Siemens, 2005a, p.3). As will be discussed in the Web 3.0 section, advances in technology are increasingly able to enumerate and visualize these connections. But ultimately, it is up to the learner to decide what connections are meaningful to them.

The use of a flexible social bookmarking service like Pearltrees to provide a set of core resources that learners could then add to (as a result of interacting with RSS aggregators) and re-shape as they see fit over time might represent a pragmatic middle ground for managing course resources.

While all learners are capable of building out a body of knowledge, the reality is that most course instructors – because of their past experiences – are in a better position to identify meaningful resources than their fellow learner "nodes". Merging the crowd-sourced power of the

pipe with some instructor core resources and starting point structure would help learners better manage the network chaos, without depriving them of the experience.

The second advantage of social bookmarking services is the ability to not merely record and structure the learning resources one has encountered but to also be able to comment upon them and thus further expand the intelligence of this network. And with this we transition to the topic of "remixing", the second core activity associated with connectivist pedagogy.

Remixing

Connectivist pedagogy advocates active learner participation. As we have discussed thus far, this includes helping to identify one's own learning resources and actively seeking to record, organize and make sense of that information. But the connectivist learner is also expected to venture further up Bloom's taxonomy to analyze and evaluate the resources they consume and "remix" it by adding their input in a digitally public fashion that expands the intelligence of the pipe (Kop, Fournier & Mak, 2011, p. 79). Making comments in a social bookmarking tool. Tweeting out an interesting article or helpful link. Posting to a discussion forum.

These "low-demand" actions aid the network in two ways. The first way is more obvious. A fellow learner's direct comments helps others better navigate the vast range of choices and options (such as by identifying a great new app or tutorial). But equally important, in the web 2.0 (and beyond) worlds, learner actions provide meta-data that web applications can aggregate and leverage. For example, RSS aggregation tools and social bookmarking tools can "learn" what are the most viewed or commented upon links and elevate their status accordingly (i.e., front page status in a News.li paper). Connectivism encourages learners to be good network citizens, as in the end, everyone benefits from a "smarter pipe".

Discussion forums/social networks.

Effectively leveraging discussions in a connectivist environment has proven historically to be a challenge (Mackness, Mak & Williams, 2010, p. 270-1). Moving such discussions from behind the closed walls of a learning management system to more open environments such as Google+ that still support threaded discussions is a start. But two key challenges remain. The first is that the connectivist "we are all equal nodes" philosophy combined with the fact that connectivist courses are often MOOCs featuring a thousand plus learners results in discussion environments that are often left to mediate themselves. As such netiquette can be a real issue (Mackness, Mak & Williams, 2010, p. 271) and learners struggle to establish the personal connections associated with a smaller, closed discussion forum environment.

Herein lies one of the contradictions of the connectivist pedagogy. In its attempt to be open and democratic and tap into the power of the broader network, learners are left feeling adrift in an ocean of information and social disconnection (Anderson & Dron, 2011, p.89). As recounted by Mackness, Mak & Williams (2010, p. 278) in one of the first large connectivist oriented MOOCs, learners abandoned the discussion board in droves due to off-putting mediation and unchecked bad behavior from some participants. What informally emerged afterwards were smaller tight-knit discussion groups (Mackness, Mak & Williams, p. 271). Whether officially encouraged or not, I believe these smaller groups will naturally emerge in a connectivist environment out of a basic human need for some degree of familiarity, safety (and connection) to help mitigate the cognitive stress of the chaotic connectivist environment.

One of connectivism's key thought leaders has expressed concerns about the groupthink and close mindedness of smaller discussion groups (Downes, 2007). Here again, however, is where learner needs may need to trump pure expressions of connectivism. Perhaps there is a

way to leverage the power of the crowd (such as upvoting potential discussion topics) while still seeking to create smaller, safer discussion group environments.

Could students seeking to participate in discussions be automatically "enrolled" into a group of say twenty learners upon their first forum post? Could that enrollment tap into learner data to try to create diversity in group make-up that would help mitigate some of Downes' concerns? The mechanics and details of effective discussion group management (e.g., should groups be maintained throughout the course?) in a connectivist environment is a topic that needs to be further explored.

One interesting approach that was leveraged in a small connectivist oriented course (we will not debate here whether a "true" connectivist course must be a MOOC) was to have the instructor manage first module discussion (as well as leadership roles involved with curating or creating content) so to model "best practices" behavior that the learners could draw upon when it came their time to lead. (Barnett, McPherson & Sandieson, 2013, p. 690). In this way, the instructor still occupies the role of "fellow node", but everyone benefits from the additional expertise of the instructor in leading by example. For learners to engage, they need to feel confident (Kop & Hill, 2008, Teaching in a Connected Environment section, para. 5). Instructors have always played a key role in this. A workable connectivist pedagogy needs to recast, not cast off, the instructor.

In that same MOOC where learners fled the discussion boards, blogging was as an alternative means of being part of the dialogue. However, Mak, Williams & Mackness (2010) analysis of those participants indicated that while there is some overlap, bloggers and forum users are fundamentally different. Bloggers highly value personal expression and having a

"home base". Forum users value the familiarity and rapid and lively conceptual discussions afforded by that technology (Mak, Williams & Mackness, 2010, p. 280-2).

As such, blogs cannot be viewed as a discussion board back-up plan. The topic of blogs does provide a transition to discuss the third key connectivist pedagogical activity, repurposing.

Repurposing

The term repurposing is somewhat misleading as this essentially refers to the pinnacle of Bloom's taxonomy: creation. The term stems from the connectivist belief that anything a learner creates is inevitably inspired by (or connected to) an original source material. A prototypical example of repurposing is when learners curate their RSS feeds and other Internet material into their own custom publication, adding their own editorial comments and creative flourishes to personalize the artifact. Flipboard is one such web 2.0 application.

Repurposing encompasses virtually any form of digital communication, including blogging, wikis, podcasting, videos, infographics and hypermedia mash-ups. Prior to the advent of Web 2.0 technologies, the creation of such content required a large amount of time, technical expertise and expense. Creating a website, for example, was a major technical undertaking. Today, virtually anyone can bring a blog online in a matter of minutes, often even for free. High production value videos and animations can be created in a matter of hours, rather than weeks or months. The opportunities and possibilities for self-expression have never been greater. Web 2.0 technologies enable anyone with an Internet device to become content creators.

As such, the connectivist pedagogy is focused around the creation of learner artifacts that leverage a wide range of free or low-cost web 2.0 technologies. Furthermore, connectivism believes it is the learner's responsibility to leverage the network to teach oneself how to use these technologies. The connectivist pedagogy wholeheartedly concurs with Seymour Papert (as cited

by Tapscott, 2010): "…every time you teach something, you deprive a child of the pleasure and benefit of discovery" (From Instruction to Construction section, para. 1).

True to its open nature, connectivism courses provide maximum flexibility relative to the types of artifacts learners can create as well as the technologies they can utilize. However, this same latitude can be problematic, particularly for those less technically adept. It is impossible to provide technical support for a countless range of resources.

A good compromise might be to identify a lead technology for which tutorial resources could be provided (that learners could then supplement), while still allowing for learners to utilize alternative technologies that they might already possess working knowledge of.

Feed forward

The last of the key connectivist pedagogical activities is "feeding forward". Interpreted most literally, this is about learners digitally sharing the artifacts they have created to propel the conversation forward. But this also relates to the notion of being good digital citizens and providing the commentary, feedback and meta-data that enables the network to continually grow smarter. It's also about embracing one's role in the broader learning community beyond your fellow course mates and making all your resources and artifacts available to future learners.

Unfortunately, if such learner input is only provided in the context of a closed learning management system, the greater network value of a learner's educational journey is lost. The small node (the class) might benefit, but not the broader network. With a closed learning management system, it's as if the reset button is pressed with each new course. Nothing is fed forward.

Web 3.0

Web 3.0 is often described as the personalized or semantic web. Pandora and other music recommendation services are prototypical web 3.0 applications, but here we will relate it to RSS aggregation. A 2.0 version of RSS involves you identifying what feeds you want delivered to your reader. A 3.0 version of RSS might start in the same place, but then based on what articles you read or liked or engaged with in some way, the system would dynamically alter what is fed. Similarly, a 3.0 version of search begins to dynamically leverage individual specific "meta-data" (past search/click behavior, fellow social network participants, media preferences) in determining what links to display and in what order. To extend this further, that same meta-data can be leveraged in aggregate to determine how different links are thematically connected to one another. Picture a search engine where results are displayed as a 3-D model much like a molecular model. This type of technology applied to a search engine like Google Scholar would make exploring the strands of a research topic much easier.

As these examples demonstrate, web 3.0 is driven by what is referred to as machine learning. But for a machine to be able to learn and then communicate what it has learned to other machines, a common language must be spoken. This is what the standards movement is all about – developing a common language. Once there is a common language, information can be brought together in one place, making lifelong learning portfolios and universal academic badging systems a reality. The central importance of this common language is why Web 3.0 is also often referred to as the semantic web.

How will the advent of Web 3.0 technologies impact the connectivist pedagogy? It will undoubtedly make navigating the pipe much easier. Making it easier to connect like ideas. And like minds. But if patterning is vital to learning as Siemens asserts (2005b, p.10), what happens

when machines start patterning for us? Will it be a boon to personal creativity and cross-disciplinary thinking? Or will our ability to make these neural jumps begin to atrophy?

As of today, connectivism has failed to achieve the status as a fully actionable pedagogical approach. But the promise of web 3.0 and beyond is the ability for connectivist courses to fully connect learners to the possibilities of the pipe while also creating the personal connectivity of a tight-knit learning community.

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