

Distributed teaching

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Introduction

The central phenomenon that this chapter seeks to explore is that people with the job title of 'teacher' are almost never the only teachers in a learning transaction, and autodidacts are almost never solely responsible for their own learning. As well as designated teachers and students, text book authors, editors, illustrators, exam boards, curriculum designers, governments, timetablers, classroom designers, architects, learning management system managers, counsellors, career advisors, makers of YouTube videos, discussion forums, friends, family, and very many other individuals and groups can and do play an active and often highly significant teaching role in guiding, supporting, and managing the learning process. Online learning, especially when it involves a team of specialists working on a course, makes the distributed nature of the process very visible, and the relative autonomy of online learners makes it more likely that they will seek additional or alternative supports for learning, but virtually all conventional in-person teaching involves multiple teachers too, from peers to textbook authors and, most especially, the learners themselves.

Formally distributed teaching

In most traditional in-person formal education and training, the teacher tends to be seen as the dominant or sole director of the learning process. This sovereignty is often, quite literally, embedded in the architecture of our educational institutions, through the placement of seats in lecture theatres and classrooms to timetables and classroom etiquette. The limits of formally distributed teaching normally extend only so far as co-teaching, whether it be two or more teachers simultaneously sharing the same classroom, or two or more teaching the same class asynchronously over time, or the deliberate use of peer teaching strategies. The process is agile, social, and adaptable to different learning needs, but it scales very poorly and relies on excellent teachers for its success.

Though this pattern may be replicated in distance education, many online colleges and universities instead follow an industrial model, using a highly distributed teaching process, divided into many subtasks and allocated to specialist members of a team: subject matter experts, learning designers, programmers, system administrators, graphic artists, editors, media specialists, course coordinators, tutors, and so on. The approach is efficient, reliable, and scalable. However, development is typically cumbersome and slow, and the process tends to be inflexible, and less social than in-person teaching.

Formal distribution of the teaching process is, however it is accomplished, only the tip of the iceberg.

Distributed teaching within the classroom or online environment

Even in a highly teacher-controlled classroom context, many pedagogical decisions - things that affect the learning process - will normally have been made by others. Timetablers, for instance, will have determined the time of day and, perhaps, the amount of time allocated for the process, both of which may have significant pedagogical consequences. Course lengths are often similarly predetermined, or vary only within a limited defined range. Designers of classrooms may influence, if not outrightly constrain, the kinds of teaching that may be achieved in them. Even classroom cleaners can affect outcomes. Curricula may be limited by both institutional requirements and the demands of external standards bodies, that may determine not only content but forms and amounts of assessment, in turn deeply affecting the kinds of teaching that are possible. More prosaic rules and regulations that operate at an institutional level, such as compulsory attendance or behaviour rules, impose further boundaries. The extrinsic motivation entailed by the need to provide formal grades may massively impact intrinsic motivation and require complex motivational strategies from the teacher. At the very least, these and similar constraints will place enormous pressure on teachers to inventively adapt to requirements, forestalling the use of many alternative pedagogies. Often, the default paths they dictate may be quite deterministic.

More tangibly, where textbooks are used, textbook authors are also co-teachers of the subject, overlaying their own pedagogical methods over those of the designated teachers, or vice versa. In turn, textbook authors are only part of a team that includes editors, artists, designers, typesetters, reviewers, and often many more, any or all of whom may perform tasks that greatly influence the learning process. Similarly, different media, such as video, audio, games, and simulations, may be powerful co-teachers in a typical conventional classroom, and typically result from the work of teams of specialists, each of whom contributes to the learning experience.

Intentionally or not, other students often play a significant role. Beyond deliberate peer teaching, other students can make a significant impact on the learning process in even the least interactive lecture. It is difficult, for example, to focus on learning when others around you are visibly bored. Equally, enthusiasm and interest can be highly infectious, and questions shared help in direct and indirect ways with learning. This extends beyond the classroom itself - often, conversations or even simple gestures or postures before or after a class can have positive or negative effects.

Regardless of how formal teaching is designed or delivered, *online* learners are always very much in control of their learning paths, and they can (and usually do) take advantage of that. Minimally, they can usually rewind or re-read things that are harder to grasp, it is almost ubiquitous for them to seek further sources of knowledge and skills than those provided by

course resources, and research shows there to be enormous differences in the order and approach taken to accessing them. Even for in-person learners, homework has always offered learners control over the time, place, space and (to at least an extent) the method of study. Moreover, classroom or online learning almost never includes within it an end-point at which all learning engendered by it has occurred. The typical learner's path continues, often far into the future, and the meaning and value of lessons may only become clear days, months, years, or even decades after the lesson itself has ended.

Finally, by far the most significant teacher in even the most constrained, teacher-led, in-person learning activity is always the individual learner. It is always the learner who, in the final analysis, orchestrates the activities, readings, lectures, discussions, and so on to do the actual learning.

Distributed teaching beyond institution's walls

Beyond direct contributions of others to planned learning trajectories, teaching - in the sense of the transfer of knowledge or skills from one person to another - is embedded in the very fabric of our manufactured and social world. Handles on doors communicate their purpose to be pulled, visible threads on bottle caps imply an intent that they are to be turned, paths invite people to walk upon them, and so on. We learn even more through many channels of intentional signals, from labels to instruction manuals to signposts, from news stories to TV advertisements. Our designed environment is not just a set of tools that achieve specified purposes, but a means by which both simple and complex concepts are communicated and shared. Researchers in the rich field of socially distributed cognition make a strong case that our conventional view of learning as something that occurs in our brains or, at least, within our bodies, is at best naive and at worst mistaken (Clark, 2008).

As Aristotle observed, even in the absence of tangible artefacts, much of our learning (especially at an early age) relies not on formal teaching but on imitation. Beyond imitation, we actively construct models from how others behave. As Bandura (1977) puts it, "from observing others one forms an idea of how new behaviours are performed, and on later occasions this coded information serves as a guide for action" (p. 27). Learning occurs not only when we observe, model, or imitate, but when we interact and communicate. As Dewey (1916) put it, "Not only is social life identical with communication, but all communication (and hence all genuine social life) is educative." We all teach one another.

Seen from these perspectives, there is very little in human life that is not, in some sense, educative, and that is not the result of many individuals, often including those far distant in time and space, acting (intentionally or not) as teachers of one another. Most of those we describe as autodidacts are therefore anything but. The autodidact is, in fact, a distance learner, albeit one with potentially greater control of the overall curriculum than a conventional program student in an institution, and with potentially less opportunity to receive external feedback on their learning.

Disruptive distributed teaching

Dewey's observation about the educative nature of communication is situated in a broader commentary in which he establishes an appropriate balance between direct associations formed through experience and formal schooling, which he sees as essential to communicate the resources and achievements of a complex society. However, since Dewey's time, we have offloaded vastly greater amounts of our cognition into technological substrates, primarily those connected by mobile and Internet technologies, but also in mass media and even a greatly expanded market for conventional books and journals. Much of this abundance - from articles on Wikipedia to YouTube lessons to StackExchange answers - is directly intended to teach, but even our informal exchanges through email and other social media are educative in nature, and almost every search query is in pursuit of knowledge. Once basic literacies have been attained (and there are many apps, individuals, and websites available to support that) it now actually *is* (in principle) possible to transmit virtually *all* the resources and achievements of a complex society, not just the relatively small subset that might be taught in schools or universities, with little or no formal teaching. Disruptive initiatives such as Mitra's Hole in the Wall or One Laptop Per Child show (imperfectly) *not* that children can learn well without teachers, but that they *can* learn well with one another, and with the countless other teachers available through the Internet. A single teacher can potentially reach billions of learners, and everyone can potentially access the knowledge and teaching of billions of teachers.

We have not yet reached the point that schools and colleges can be abandoned. One of the consequences of this massive expansion is that we suffer from an information glut, including much that is contradictory, false, malicious, or biased. Also, the rate of change in skills required even to achieve technical proficiency in use of tools has accelerated exponentially, so even accepted existing knowledge may often be unstable. The cornucopia of information and communication, to which we have access today, entails that we must learn a lot of new or augmented skills that were not required in Dewey's day: we must better understand how to act as critics, editors, and filters, must manage privacy, security, and our own online identity, must learn what to trust and how to cope with contradiction, to a far greater extent than those exposed only to a pre-filtered stream in the past. Perhaps more importantly, we must relearn the value and meaning of in-person interactions, to rediscover when and why being with and doing things in physical space with other people matters.

A number of theories and models of learning have developed in recent years that actively seek to grapple with this radically changed context, fuelled by a growing understanding of the complex adaptive systems in which we all participate. Dron & Anderson (2014) have labelled these the 'connectivist generation' of pedagogies. As well as Connectivism itself (Siemens, 2005), others in the connectivist family include Networks of Practice (Wenger, Trayner, & de Laat, 2011), distributed cognitive apprenticeship (Collins, Brown, & Holum, 1991), heutagogy (Hase & Kenyon, 2000), and many more. Among their shared assumptions are:

- That personal autonomy is a fundamental right of learners, as well as critical to successful learning;

- That learning is a complex social activity, that can and does occur effectively in networks (rather than only in hierarchical, designed groups), and that diversity of needs, interests, and skills can drive it;
- That information glut is now more of a problem than information paucity, and that the rate of change accelerates all the time; thus learning to how to learn, and where to go to find knowledge, matters more than what we already know;
- That, faced with a glut of information that can easily be discovered when needed, the skills that matter lie in finding it, judging it, making connections between ideas and concepts, and building effective networks with others.
- That the act of creation is also an act of learning, and that sharing of what we create is a fundamental skill and requirement for modern learners.
- That the combined complex interactions of diverse people and the objects they create leads to emergent knowledge, and to deeply interconnected learning.

Distributed cognition lies deep in the heart of all connectivist models. They seek to explain knowledge that exists not just inside an individual's head, but that is distributed across a vast network of both local and remote embodied knowledge, and they seek to identify the skills and literacies needed to accommodate and make best use of this phenomenon. For example, Seely Brown describes the process of learning that occurs in the open source software community, as a form of distributed cognitive apprenticeship (Brown, 2006, p. 23), whereby the process of working on software others have created, observing their practices, sharing problems and solutions, and discussing issues, allow new developers to become part of the software development culture as much as to produce software: they learn to be, not just to do, through active participation in a richly varied network in which everyone, and every thing they create, is a teacher. Unlike earlier models of learning, connectivist theories are not just implicitly reliant on a distributed teaching role: they are explicitly predicated upon it.

Collectively distributed teaching

The social network ties for connectivist learning are sometimes so tenuous as to be negligible: for example, when seeking answers from a Q&A community we seldom care precisely who provides the answers we seek. Although they are inhabited spaces, these are not really social networks at all, so Dron & Anderson (2014) describe them as 'social sets'. For learners using primarily set-oriented sites like Wikipedia, StackExchange, Reddit, or YouTube, there are risks of false information, poor reliability, irrelevance, and, thanks to the lack of persistent social ties, concerns about flaming, trolling, faking, and other undesirable aspects of largely anonymous interaction. One at least partial solution to this problem lies in collective intelligence or, for short, collectives. A collective is a means to make the crowd into a teacher. It is a combination of the collected actions of a (usually anonymous) crowd of humans and an algorithm, which may be enacted by humans and/or by machines, through which a large number of people can act as though they were a single agent. The PageRank algorithm, for example, used by Google Search, mines millions of web pages for links, treated as implicit recommendations, in order to determine the order of search results. Collectives can also emerge in physical settings - for instance, when we are drawn to look in the same direction as others in a crowd, or seek a show of hands in a classroom - but, when embedded in software, they allow far more complex and subtle algorithms. Some of these can help with learning: Google Search, for instance, is often

the first port of call for learners in search of people or information, collaborative filters can help us find useful books or videos, karma points and upvotes can help us distinguish useful answers on StackExchange, etc. Such part-human, part-machine collectives are highly distributed teachers that can thus play one of the key roles of a physical teacher in guiding and/or structuring learning. Collectives tend to be very prone to filter bubbles and intentional abuse, and most commercial variants tend to only focus on individual preference rather than value to learners, but a steady flow of collectives intended for learning has none-the-less been developed over the past three decades. With the emergence of learning analytics and educational data mining applications, this remains an active and important area of current learning technologies research.

Conclusions

Teaching may be usefully seen as an assembly of methods, objects and ideas, orchestrated in an attempt to achieve learning. This is not just a behaviour exhibited by teachers. Amongst the many things that can be orchestrated, are existing orchestrations – the textbook being an archetypal example – that are intended to teach. Crucially, the final orchestrator – the one who makes sense of it all – is always the learner.

Among the many implications of this perspective is that pedagogies are highly situated, relying on countless other technological and pedagogical parts to perform their role successfully. Some parts are physical, some organizational, some conceptual. Most teaching involves non-technological phenomena, too, such as relationships between people, enthusiasm, and so on. It is therefore no surprise that it is often hard to repeat success in teaching, or that research studies come to wildly differing conclusions about the effectiveness of different kinds of intervention, because the balance of teaching in every single case, for every single learner, is inevitably different - often radically so - than that of every other. Equally, teaching interventions that may *seem* very different (e.g. online vs in-person) may, as orchestrated by the learner, turn out to be very similar. To be an effective teacher in this context is not to attempt to subdue this wealth of other teachers, but to embrace it: to let go, and to see our roles as signposts, role models, caring friends, and boundary setters, more than guides or dictators of the process.

References

- Brown, J. S. (2006). New learning environments for the 21st century: Exploring the edge. *Change: The magazine of higher learning*, 38(5), 18-24.
- Clark, A. (2008). *Supersizing the Mind: Embodiment, Action, and Cognitive Extension: Embodiment, Action, and Cognitive Extension*. Oxford University Press.
- Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American educator*, 15(3), 6-11.
- Dewey, J. (1916). *Democracy and Education*. New York: Macmillan. Retrieved from. Retrieved May 21, 2001, from the World Wide Web: http://www.ilt.columbia.edu/projects/digitexts/dewey/d_e/contents.html

- Dron, J., & Anderson, T. (2014). *Teaching crowds: Learning & Social Media*. Athabasca: AU Press. Retrieved from <http://teachingcrowds.ca>
- Hase, S., & Kenyon, C. (2000). From Andragogy to Heutagogy. *ultiBASE*. Retrieved from <http://ultibase.rmit.edu.au/Articles/dec00/hase2.htm>
- Siemens, G. (2005). Connectivism: a learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1). Retrieved from http://www.itdl.org/journal/jan_05/article01.htm
- Wenger, E., Trayner, B., & de Laat, M. (2011). Promoting and assessing value creation in communities and networks: A conceptual framework. *The Netherlands: Ruud de Moor Centrum*.