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Learning As Conversation

Transforming Education in the Mobile Age

Introduction

Every era of technology has, to some extent, formed education in its own image. That is not to argue for the technological determinism of education, but rather that there is a mutually productive convergence between the main technological influences on a culture and the contemporary educational theories and practices. Thus, in the era of mass print literacy, the textbook was the medium of instruction, and a prime goal of the education system was effective transmission of the canons of scholarship. During the computer era of the past fifty years, education has been re-conceptualized around the construction of knowledge through information processing, modelling and interaction. Now, as we enter a new world of global digital communication, it is no surprise that there is a growing interest in the relations between mobile technology and learning. What we lack, however, is an innovative and enhancing educational framework for the mobile age.

A framework for learning in the mobile age should recognize the essential role of communication in the process of coming to understand the world and in negotiating agreements among differing perspectives. It should also indicate the importance of context in establishing meaning, and the transformative effect of digital networks in supporting virtual communities that transcend barriers of age and culture. One starting point is to examine learning as communication. The educational theorist John Dewey claimed:

> Not only is social life identical with communication, but all communication (and hence all genuine social life) is educative. To be a recipient of a communication is to have an enlarged and changed experience. One shares in what another has thought and felt and in so far, meagerly or amply, has his own attitude modified. Nor is the one who communicates left unaffected. … Except in dealing with commonplaces and catch phras-

> es one has to assimilate, imaginatively, something of another's experience in order to tell him intelligently of one's own experience. … It may fairly be said, therefore, that any social arrangement that remains vitally social, or vitally shared, is educative to those who participate in it.[1]

According to Dewey, then, communication is the central process of education. It is the means by which we negotiate differences, understand each other's experiences, and establish shared meaning. The conception of education as the liberal sharing of experience raises both philosophical and practical issues, which are re-surfacing in the age of mobile communication. An implication is that a teacher has no ontologically privileged position, but is simply another participant in the conversation of learning. This does not fit easily with traditional classroom schooling. It challenges the classroom as an environment in which both the structure and content of discourse are regulated externally by the curriculum and the examinations system, and where communications are mediated by the teacher. The carefully bounded discourse of formal education contrasts with the rich interactions that children engage in outside school, through mobile calls, texting and computer messaging, and by conversing in online communities. These two worlds are now starting to conflict as children bring mobile phones into the classroom or share homework online.

Rather than seeing mobile communication and online communities as a threat to formal education, we need to explore how education could be transformed for the mobile age, through a dialogue between two worlds of education: one in which knowledge is given authority through the curriculum, the other in which it emerges through negotiation and a process of coming to mutual agreement. Ironically, a process of learning by negotiation does occur in the world of formal learning, among those experts who set the curriculum, but learners (and most teachers) are generally excluded from that process.

Learning as Conversation in Context

We describe a view of learning as a process of "coming to know" by which learners in cooperation with peers and teachers, construct transiently stable interpretations of their world. This "radical constructivism"[2] extends the notion of learning as a constructive process beyond the indi-

[1] John Dewey, *Democracy and Education*, New York: Macmillan, 1916, pp. 6 f.

[2] E. von Glaserfeld, "An Introduction to Radical Constructivism", in P. Watzlawick (ed.), *The Invented Reality*, New York: Norton, 1984, pp. 17–40.

vidual to describe how organizations, communities and cultures learn and develop. The general approach makes no distinction between people and interactive systems such as computers, with the great advantage that the theory can be applied equally to human teachers and learners, or to technology-based teaching or learning support systems.[3]

The description given here of learning as conversation in context is primarily based on the work of Gordon Pask.[4] It derives from cybernetics, the study of communication and control in natural and artificial systems, and its more recent extension to second order cybernetics, the study of the mechanisms by which a system can understand itself. With a prescience that foreshadows recent developments such as the Semantic Web (the development of the worldwide web into a knowledge-based medium) and grid computing (pervasive computing power available like electricity on an international grid) Pask proposed a new conception of communication. Rather than seeing communication as the exchange of messages through an inert and transparent medium, he reconceived it as consisting of program sharing and linguistic interaction within a pervasive computational medium.[5] Thus, media are active computing systems within which mind-endowed individuals (people and intelligent systems) converse.

Pask's definition of a "mind" was broad, to encompass any organization expressed in a mutual language (able to accommodate commands, questions and instructions) that gives rise to thought, feeling and behaviour. This includes human minds, but also some computer programs, and even theatre scripts and political manifestos. Minds, by expressing language and instantiating different systems of belief, provide the impetus for conversation. For example, a political ideology instantiates a system of language and beliefs which, when expressed in a party manifesto, gives rise to debate and discussion. On a smaller scale, two children with different views of a shared phenomenon such as a physics experiment, and capable of expressing their views in a mutual language, engage in con-

[3] The concomitant problem, which should be recognized from the outset, is that on its own the theory does not give sufficient importance to the unique moral and social worth of human learners in their interaction with technology. We shall address this issue in future papers.

[4] G. Pask, *Conversation Theory: Applications in Education and Epistemology*, Amsterdam: Elsevier, 1976.

[5] G. Pask, "Minds and Media in Education and Entertainment: Some Theoretical Comments Illustrated by the Design and Operation of a System for Exteriorizing and Manipulating Individual Theses", in R. Trappl and G. Pask (eds.), *Progress in Cybernetics and Systems Research*, vol. IV, Washington, DC: Hemisphere Publishing Corporation, 1975, pp. 38–50.

versation to try and come to a shared interpretation.

Thus, conversation is not the exchange of knowledge, but the process of becoming informed about each other's "informings" (what Pask described as the "coordination of coordinations of coordinations")[6]. Higher level coordinations are "tokens" for lower-level coordinations (objects and events), which are themselves tokens for stabilities of sensori-motor activity and "structural coupling" with the environment. In order to constitute a "conversation", the learner must be able to formulate a description of himself and his actions, explore and extend that description and carry forward the understanding to a future activity. In order to learn, a person or system must be able to converse with itself and others about what it knows.

Central to these learning conversations is the need to externalize understanding. To be able to engage in a productive conversation, all parties need access to a common external representation of the subject matter (an agreed terminology, and also notes, concept maps or other learning resources) that allows them to identify and discuss topics.

Relating this to education, learning requires more than transparent channels of communication and a means for transmitting knowledge, we also need a shared language (among learners, and between learners and computer systems), a means to capture and share phenomena, and a method of expressing and conversing about abstract representations of the phenomena. Learning is a continual conversation: with the external world and its artefacts, with oneself, and also with other learners and teachers. The most successful learning comes when the learner is in control of the activity, able to test ideas by performing experiments, to ask questions, collaborate with other people, seek out new knowledge, and plan new actions.

Laurillard[7] has related Conversation Theory to the design of learning technology. Though primarily concerned with the application of educational technology to university-level teaching, her "conversational framework" can be applied to the full range of subject areas and topic types.

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[6] B. Scott, "Gordon Pask's Conversation Theory: A Domain Independent Constructivist Model of Human Knowing", *Foundations of Science*, vol. 6, no. 4 (2001), pp. 343–360.

[7] D. Laurillard, *Rethinking University Teaching: A Framework for the Effective Use of Educational Technology*, London: Routledge, 1993.

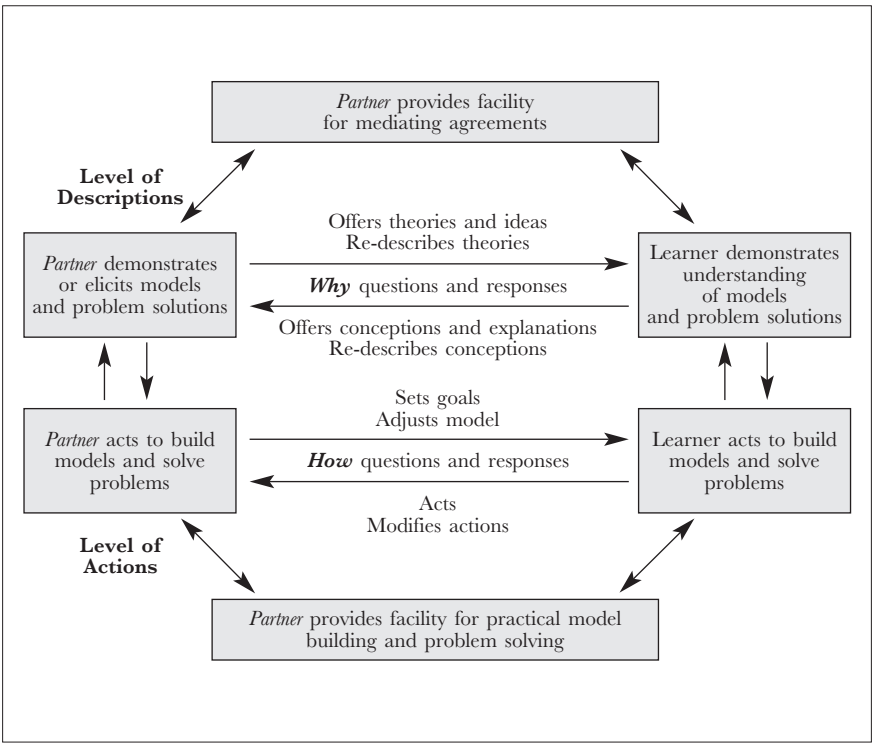

Figure 1
A conversational framework for learning with technology
(Adapted from Laurillard, *op. cit.*)

Figure 1 shows a framework for learning as conversation. Conversations can take place at two levels. At the Level of Actions, a learner and partner may converse about the performance of some educational activity, such as carrying out a scientific experiment, through discussion to establish a shared understanding of the phenomenon ("what's happening here?", "what do we do next?") producing a cycle of setting goals and building and refining practical models to test those goals. At the Level of Descriptions, the learner and partner discuss the implications of the actions, to make sense of the activity through a process of proposing and re-describing theories and offering and adjusting explanations ("why did that happen?", "what does this mean?"). These conversations can be mediated by external representations to assist the learners in negotiating agreements, such as lab notebooks or shared concept maps. In addition

to these external conversations, each learner holds a continual internal dialogue, making sense of concrete activity by mental abstraction and by forming theories and testing them through actions in the world.

It should be emphasized that the conversational framework is not a normative lesson plan, but a means to describe the process of coming to know through conversation. Laurillard proposes that for learning to succeed, the student must:

- Apprehend the structure of the discourse
- Interpret the forms of representation
- Act on descriptions of the world
- Adjust actions to fit the task goals
- Adjust descriptions to fit the topic goal
- Reflect on the cycle of goal, action, feedback

Some educational activities, such as science lab classes, are explicitly designed to support this structure of conversation. Mostly, the conversations only cover one part of the framework, either because the learner has no conversational partner available, or there are no tools for model building to hand, or learners lack the language and concepts to converse at the level of descriptions. That is where technology can assist. The conversational framework shows a conversation between learner and partner. The partner may be a teacher, or another learner, or it may be computer or communications technology.

Technology may take the place of the teacher, as in drill and feedback. The difficulty here is that the computer can hold a limited dialogue at the level of actions: "look here"; "what's this?"; "do that", but is not able to reflect on its own activities or its own knowledge. Although some "intelligent tutoring systems" have been developed which attempt to model the student and to tailor feedback to the perceived student needs, the computer is not engaging in developing a shared understanding. And because it cannot hold a conversation at the level of descriptions, it has no way of exploring students' misconceptions or helping them to reach a shared understanding.

The technology may provide or enrich the environment in which conversations take place. It can provide tools for collecting data and for building and testing models. It can extend the range of activities and the reach of a discussion, into other worlds through games and simulations, and to other parts of this world by mobile phone or e-mail. The technology provides a shared conversational learning space, which can be used not only for single learners but also for learning groups and communities. Tech-

nology can also demonstrate ideas or offer advice at the level of descriptions, as with the worldwide web or online help systems, or through specific tools to negotiate agreements, such as concept maps and visualization tools.

Though technology for learning conversations, such as virtual learning environments, discussion forums, online communities and help systems, have had some success in mediating learning, their value is limited, in part because they cannot support the full range of conversation. Because they do not share the learner's context, their ability to give practical advice, at the level of actions, is limited.

Context and Learning

All activity is performed in context. Cole[8] makes an important distinction between context as "that which surrounds us" and context as "that which weaves together". This mirrors the distinction made in the technical literature on pervasive computing between context as a "shell" that surrounds the human user of technology and context as arising out of the constructive interaction between people and technology.

The "context as shell" model, exemplified by the Shannon–Weaver informational model of communication, situates the learner within an environment from which the senses continually receive data that are interpreted as meaningful information and employed to construct understanding. Thus, a learner in a classroom may receive information from a teacher, a whiteboard and a text book, all of which must be assimilated and integrated to form a composite understanding of the topic being studied.

But learning not only occurs in a context, it also creates context through continual interaction. The context can be temporarily solidified, by deploying or modifying objects to create a supportive workspace, or forming an ad hoc social network out of people with shared interests, or arriving at a shared understanding of a problem. But context is never static. The common ground of learning is continually shifting as we move from one location to another, gain new resources, or enter new conversations.

Traditional classroom learning is founded on an illusion of stability of context, by setting up a fixed location with common resources, a single teacher, and an agreed curriculum that allows a semblance of common ground to be maintained from day to day. If all these are removed, as may

[8] M. Cole, *Cultural Psychology: A Once and Future Discipline*, Cambridge, MA: Harvard University Press, 1996.

be the case with learning in the mobile age, then creating temporary islands of relatively stable context is a central concern. In this respect, the historic construction of context, the process by which we arrive at current understanding, assumes greater importance.

Current activity can only be fully understood by taking an historical perspective, to understand how it has been shaped and transformed by previous ideas and practices.[9] This is particularly true of mobile learning, where both the immediate history of activity and the wider historical process of coming to know merge to create new understanding. For example, a visitor to an art gallery stands in front of a painting. She has arrived at a current understanding of the painting from the path she has taken through the gallery – taking in the ambience, stopping at other paintings, reading the guidebook – and also from a lifetime of creating and interpreting works of art starting with childhood drawings. In one sense, context can be seen as an ever-playing movie, with each frame of current context being the inevitable progression from earlier ones and the entire movie being a resource for learning. But it is a movie that is continually being constructed by the cast, from moment to moment, as they share artefacts and create mutual understanding through conversation.

Education in the Mobile Age

The implications of this re-conception of education, as conversation in context, are profound. It removes the solid ground of classroom instruction, and of education as the transmission or construction of knowledge within the constraints set by a curriculum, and replaces it with a cybernetic process of learning through continual negotiation and exploration. This can be seen as a challenge to formal schooling, to the autonomy of the classroom and to the curriculum as the means to teach the knowledge and skills needed for adulthood. But it could also be an opportunity for technology to bridge the gulf between formal and experiential learning. Thus, Dewey contends:

> As societies become more complex in structure and resources, the need of formal or intentional teaching and learning increases. As formal teaching and training grow in extent, there is the danger of creating an undesirable split between the experience gained in more direct associations and what is acquired in school. This danger was never greater than at

[9] Y. Engeström, *Perspectives on Activity Theory*, Cambridge: Cambridge University Press, 1996.

> the present time, on account of the rapid growth in the last few centuries of knowledge and technical modes of skill.[10]

New mobile and context-aware technology can enable young people to learn by exploring their world, in continual communication with and through technology. Instant messaging, for example, enables people to create learning communities that are both contextual, in that the messages relate to locations and immediate needs, yet unbounded since the messages can be exchanged anywhere in the world. Mobile technology can also enable conversations between learners in real and virtual worlds, such as between visitors to a museum or heritage centre, and visitors to its virtual counterpart. A person standing in front of an exhibit has the benefit of being there, of experiencing the full physical context, whereas the visitor to an online museum can call on the rich informational resources of the worldwide web. If we can design technology to enable rich conversations between these two learners-in-context, then they gain an educational experience that, in Dewey's phrase, is "vitally shared". Education in the mobile age does not replace formal education, any more than the worldwide web replaces the textbook; rather it offers a way to extend the support of learning outside the classroom, to the conversations and interactions of everyday life.

[10] Dewey, *op. cit.*, p. 11.