Activity Centred Professional Development and Teachers' Take-Up of ICT

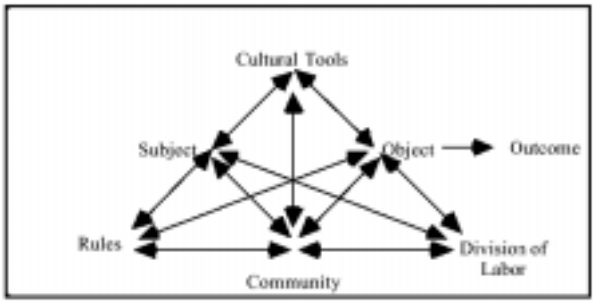
Alberto Rizzo
Melbourne Grammar School
1 Domain Rd
Melbourne 3004
arizzo@mgs.vic.edu.au

Keywords: professional development, activity theory, actor-network theory, loose coupling

This paper is based on my PhD studies on effective ways to encourage senior secondary school teachers in a traditional independent school in Australia, to take up and use ICT in pedagogically sound ways. Poor professional development strategies and events have been blamed for the apparent lack of impact that computers have made on classroom practices to date. A large part of the blame has been placed on the lack of a sound learning theory to underpin teachers' professional development with ICT, which can also serve as a sound framework for teachers to use in class with their own students.

The framework offered by *Cultural-historical Activity Theory* (Vygotsky 1978, Luria 1976, Leont'ev 1979) and its later application to organisational learning called *Expansive Learning* (Engeström, 1987, 1999, 2001) is increasingly being used to inform the creation of better teaching materials and e-Learning environments. It is suggested here that this framework can also be used to question the professional development of teachers and their take-up of computers and ICT, and their resulting changing (or opposition to changing) classroom practices.

The basic concept of Activity Theory is that learning is a human activity that is socially-situated and artefact-mediated. At its heart is the idea that internal activities, such as thinking, emerge out of practical external activity and therefore the unit of analysis must include the individual and their culturally defined context. In essence tools mediate the processes between subject and object; rules mediate the processes between subject and community; and division of labour mediates the processes between community and object (Figure 1). In other words, tools are used by subjects to achieve an object; there needs to be rules set up between subjects and the other members in the community in order to achieve the goals; and between the members of the community there needs to be a division of labour in order to achieve the object.



Fiigure 1: The Structure of Activity. (Adapted from Engeström, 1987.)

The five central tenets of Activity theory are: *a) Activity systems are the units of analysis* (activity is mediated by cultural artefacts); b) *Multivoicedness.* (activity must be analysed at various levels); c) *Historicity of activity* (changes in thinking occur in the social plane over a period of time); d) *Contradictions* are the driving force of change and development; e) *Expansive cycles* as a possible form of transformation in activity. These tenets have been successfully used in recent studies to inform analyses of the failings of computer mediated instructional materials and Teacher/Domain centred instructional materials and situations compared to e-Learning situations in which an activity-centred design with its characteristic community of learners and collaborative practices are at its centre (Gifford and Enyedy 1999, Pang and Hung 2001, Hung and Chen 2001, Engeström 1999, 2001). .

Engström (1987) puts forward a matrix (Figure 2) of the five basic learning principles above and what he considers to be the four central questions in any theory of learning: (1) *Who are the subjects of learning*, how are they defined and located? (2) *Why do they learn*, what makes them make the effort? (3) *What do they learn*, what are the contents and outcomes of learning? and (4) *How do they learn*, what are the key actions or processes of learning?

Engström proposes that using such an analysis of learning organisations in terms of their learning environments and individuals' motivations for (and against) change enables us to suggest strategies and events to successfully confront the various actors involved and trigger internal tensions and dynamics in their respective institutional contexts that can energise a serious learning effort on their part.

	Activity system as a unit of analysis	Multi-voicedeness	Historicity	Contradictions	Expansive Cycles
Who are learning?					
Why do they learn?					
What do they learn?					
How do they learn?					

Figure 2: Matrix for the Analysis of Expansive Learning and Central Questions. (Engeström 2001: 138)

This approach is similar to Actor-Network Theory (Callon 1986, 1987, Latour 1988, 1993, Bigum 2000) in that it locates learning in a heterogeneous network of human and non-human actors. Engeström (2001:137) comments that some discussion between activity theory and actor-network theory has been initiated, however he criticises actor-network theory for reducing all actors into 'black boxes without identifiable internal systemic properties and contradictions'. Activity theory differs from actor network theory in that it provides a pedagogical framework based on sound learning theory for the professional development and learning of individuals in an organisation, such as teachers in a school, when presented with new technologically mediated practices. This is particularly important to the present study because the most common way so far, in which educational technology has been introduced into schools has characteristically been to 'bolt-on' technology onto conventional teaching practices. This has resulted in the at best marginal impact that ICT has had on daily classroom activities. The fundamental assumption of this approach is the transmission model of knowledge transfer, where knowledge is treated as a finite and identifiable object that can be possessed by a 'teacher' (whether human or a computer surrogate) detached from any social context.

When applied to change in organisations such as schools, the transmission model has been translated to mean that innovation consists of some identifiable knowledge or sets of skills which the organisation acquires giving rise to relatively lasting change in observable behaviours. The underlying assumptions being that: a) the knowledge and skills are stable and reasonably well defined and, b) there is a competent 'teacher' who knows what is to be learned. As Engeström (2001:137) points out however, the "problem is that the most intriguing kinds of learning in work organisations violate this presupposition." Teachers, schools and school-systems involved in responding to the challenge posed by ICT are all learning something that is not stable, defined or even understood ahead of time. In other words we, as teachers and as individuals, must learn new forms of activity which are not yet there. They are learned as they are being created. There is no competent teacher.

Engeström's (1999) concept of the 'expansive cycle' begins with individual subjects questioning the accepted practice and it gradually expands into a collective movement or institution. Ascending from the abstract to the concrete is achieved through specific learning actions. Together these actions form an expansive cycle or spiral during which construction and resolution of successfully evolving tensions or contradictions in a complex system that includes the object or objects, the mediating artefacts, and the perspectives of the participants.

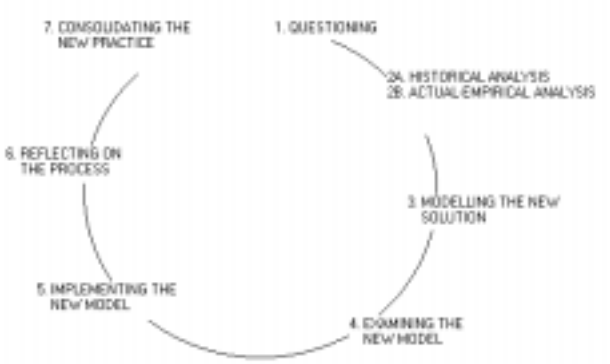


Fig 3. Sequence of Learning Actions in an Expansive Cycle. (Engeström, 1999)

An ideal-typical sequence of learning actions in an expansive cycle is described by Engleström (1999: 383) as follows:

1. Questioning—Questioning, criticising or rejecting some aspects of the accepted practice and existing wisdom.
2. Analysing the situation—Analysis involves mental, discursive, or practical transformation of the situation in order to find out causes or explanatory mechanisms. Analysis evokes "why?" questions and explanatory principles. One type of analysis is 'historical-genetic,' which seeks to explain the situation by tracing origins and evolution. Another type of analysis is 'actual-empirical'; it seeks to explain the situation by constructing a picture of its inner systemic relations.
3. Modelling—Modelling the newly found explanatory relationship in some publicly observable and transmittable medium. This means constructing an explicit, simplified model of the new idea that explains and offers a solution to the problematic situation.
4. Examining the new model—running, operating and experimenting on it in order to fully grasp its dynamics, potentials and limitations.
5. Implementing the model—concretising it by means of practical applications, enrichments, and conceptual extensions.
6. Reflecting and evaluating the process and evaluating its outcomes into a new, stable form of practice.

Engeström's work has shown that issues of pedagogy are important even in workplaces where no one is formally allocated a 'teaching role' in the promotion of an innovation and where there is no clear model of what the new practices look like. The theory of expansive learning is clearly a very useful theory of organisational learning for learning organisations struggling to develop new practices that make full use of the potential benefits of new technologies in the classroom.

Elmore (2000) further suggests the concept of 'Loose Coupling' as an explanation of why innovations in schools do not have a good chance of success. That is, there is 'loose coupling' between the technical core of education and the administrative super-structure. In the context of teacher evaluation aimed at improvement, the core of this argument is that:

> Because the technical core of education systems is weak, disordered and uncertain, because of doubts about the status of teachers professional knowledge, the surrounding administrative arrangements prefer to ignore it thereby acting mainly to shield the fragile core from external scrutiny and criticism, thereby missing out on an opportunity for honest reflection and improvement.
>
> Elmore (2000)

In the context of the history of implementation practices used with ICT in schools, then one is tempted to say that not only is it characterised by an almost total lack of underpinning by sound learning theory, but that there seems to be 'loose coupling' at, and in, every element of the complex interplay of agencies. If we take Engstrom's Activity Theory/Expansive Learning as a platform on which to question innovations in schools, that means that there is 'loose coupling' inside each of the elements in the triangle he put forward—the subject (teachers—personal theories of learning/micropolitics/beliefs/views of themselves and of themselves as teachers, etc.); the rules (curriculum/school policies and vision/standards, school ICT and other practices, etc); division of labour (faculty/campus divisions, teachers/ administrators, roles and responsibilities of teachers with greater and lesser administrative roles, IT teachers and support personel etc); Community (colleagues/networks/parents and students/society in general/Education Dept., etc); Mediating Artefacts (Laptops vs Desktops, software, hardware, furniture, physical contexts, etc.); Object (Lack of an agreed Objective as to what schools are there to do and related lack of agreement on the role of IT within that eg.IT skills vs ICT across the Curriculum practices, Constructivism vs other views, etc.)

So, as at present we have no teacher and there is no model to follow. Strategies and events, which will successfully encourage teachers and schools to successfully take up the 'ICT-across-the-curriculum' innovation, need to be designed so that they have an impact at each of the levels identified above and in a way that brings the 'uncoupled' elements closer together in some way. That is, strategies need to be planned to deal with the Subjects, the Rules, the Community, the Division of labour, the Mediating Artifacts, and the Object in order for new patterns of collaboration and new intellectual tools to be developed. Clearly, further research is needed to better inform this process.

It seems clear however, that in this way the job of implementing this particular innovation in a specific school can be better understood and planned for; at least one can see the size and scope of the task, one which involves bringing all elements in line through a diverse range of activities and events working in concert and directed at different audiences, for different purposes and delivered through different means.

References

BIGUM, C. (2000): Actor-network theory and online university teaching: translation versus diffusion. In *Researching Futures Oriented Pedagogies*. KNIGHT, B. A. and ROWAN, L. (eds). PostPressed, Flaxton, Qld: 7–22.

CALLON, M. (1986):. The Sociology of an Actor-Network: The Case of the Electric Vehicle. In *Mapping the Dynamics of Science and Technology*. M. CALLON, J. LAW and A. RIP. London, Macmillan Press**:** 19-34.

CALLON, M. (1987): Society in the making: The study of technology as a tool for sociological analysis. *The social construction of technological systems.* In *New directions in the sociology and history of technology*. W. BIJKER, T. P. HUGHES and T. PINCH. Cambridge, MIT: Press**:** 83-106.

ELMORE, R. (2000): *Building a New Structure for School Leadership.* The Albert Shanker Institute.

ENGESTRÖM, Y. (1987): *Learning by Expanding: an activity-theoretical approach to developmental research.* Helsinki, Orienta-Konsultit.

ENGESTRÖM, Y. (1999): Innovative learning in work teams. In *Perspectives on Activity Theory*. ENGESTRÖM, MIETTINEN and PUNAMÄKI (eds). Cambridge University Press

ENGESTRÖM, Y. (2001): Expansive Learning at Work: toward an activity theoretical reconceptualization. *Journal of Education and Work* **14**(1).

GIFFORD, B. and ENYEDY, N. (1999): Activity Centered Design: Towards a Theoretical Framework for CSCL. Paper presented at the *Computer Support for Collaborative Learning Conference*. Stanford University . http://learninglab.stanford.edu/CSCL99/papers/tuesday/Bernard_Gifford_189.pdf. Accessed 3rd March 02

HUNG, D. and CHEN, D. (2001): Appropriating and Negotiating Knowledge: Technologies for a Community of Learners. *Educational Technology*, May–June.

LATOUR, B. (1988): *The pasteurisation of France*. Cambridge Massachusetts, Harvard University Press.

LATOUR, B. (1993): *We Have Never Been Modern* (C. Porter, Trans.). Cambridge, Massachusetts, Harvard University Press.

LEONT'EV, A. (1979): The Problem of Activity in Psychology. In *The Concept of Activity in Soviet Psychology*. J. WERTSCH (ed). Armonk, New York, M.E. Sharpe.

LURIA, A. (1976): *Cognitive Development: its cultural and social foundations.* Cambridge, Harvard University Press.

PANG, P. and HUNG, D. (2001): Activity Theory as a Framework for Analysing CBT and E-Learning Environments. *Educational Technology*. July–August.

VYGOTSKY, L. (1978): *Mind in Society: the development of higher psychological processes.* Cambridge, Harvard University Press.