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Information and communication technologies and higher degree research supervision

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Abstract*: For some time, higher degree research supervision has been the subject of research in universities. Universities have also been experiencing a boom in the use of information and communication technologies (ICTs) for mediating research, research training and teaching. While ICTs provide useful tools and greater connectivity for students and their supervisors and have the potential to transform supervision practice, communication problems associated with this expansion are also becoming apparent. This paper explores the nexus between supervision and ICTs and suggests that cultural historical activity theory could provide a lens for describing and understanding this nexus, through acknowledgement of the cultural, historical and technological influences that shape such complex human activity. Furthermore, activity theory perspectives can provide insight into how such activity might be transformed by exploiting inherent contradictions revealed through data collection and analysis. This paper lays the framework for the description and analysis of the activity of higher degree research supervision and transformations that may result from such studies.*

Keywords*: Research higher degree supervision; information and communication technology; activity theory.*

Introduction

Australia has seen a significant increase in research higher degree (RHD) enrolments over the past decade. The Federal Government green paper (Dawkins, 1988), and the demise of the binary system of higher education that resulted from it, has been a major contributor to this increase. Under the previous binary system of colleges of advanced education and universities, only universities were allowed to run research higher degree programs. Colleges of advanced education were restricted to coursework postgraduate studies. With the move to a unitary system where colleges of advanced education were either converted to university status, or amalgamated with existing universities, the right to offer research degree programs

spread to the thirty-six universities in the newly created system. This increased the number of research degree programs generally, and in some areas such as education, where the majority of faculties had been located in the advanced education sector, increased the numbers substantially. Coupled with this increase in numbers is an increase in diversity of the postgraduate student population (McWilliam & Palmer, 1996) and demands for greater flexibility in degree and supervision arrangements (Evans, 1997).

During this period of growth in RHD programs, there have been changes in the nature of the research degree experience for both candidate and supervisor. These include:

- Changes in the profiles of research candidates, including increases in numbers of part-time candidates, particularly in disciplines such as education, where the majority of candidates are part-time.
- The increasing need for academics to undertake large multi-institutional and multi-country research projects. These projects can involve time spent interstate and overseas and thus physically removed from their RHD students.
- Pressure from government for students to complete research degrees in shorter periods.
- The need for RHD students to be more mobile in graduate employment terms. The supply of academic positions in Australia is limited by the relatively small population and the increase in people qualified to apply for them. The possibility of finding a suitable position in the same city as the RHD program is often slim. As a result, RHD candidates may need to find positions when and where they occur, rather than waiting to complete their degrees and hoping to find a position in the same city. This can then result in the candidate being located in a city away from that of the supervisor (or having to travel further).
- The larger numbers of PhD and other RHD students is placing pressure on candidates to undertake RHD studies with particular supervisors to increase their employment prospects. A doctorate completed on a particular topic, with a supervisor known for their expertise in that area, might be necessary.
- Prospective RHD candidates and their supervisors are increasingly becoming "connected" through the Internet as they live and work in an increasingly "online" world.

Several consequences of these changes are: that face-to-face meetings might need to be out of normal work hours or under severe time constraints; that alternatives to face-to-face meetings might be utilized; and that the connectivity offered by the internet could enable access to a greater range of information sources and interactive communication to potentially enhance RHD student independence and bridge the "tyranny of distance".

These changes in the nature of the RHD experience have occurred during a period when governments have begun to take a stronger controlling interest in tertiary education generally (DEST, 2000; DETYA, 1998), and in research higher degree programs in particular (Kemp, 1999a, 1999b). Singh and Knight (2002) highlight this management interest in RHD programs by government, by outlining the ways in which research higher degree training is seen to be linked to the emerging knowledge economy. Research programs and the training they provide are seen very much in terms of human capital. The belief expressed by government that RHD programs have an important part to play in the economy is tempered by the view that universities are not doing a good job (DEST, 2000). Two related areas criticized in the DETYA (1998) report on research training were the quality of supervision of RHD students and the high drop-out rate. However, it should also be noted that the validity of the DETYA findings has been questioned, for example by Marsh (2000). So, further research is needed to understand and respond to these critiques. Nevertheless, tensions in the way RHD supervision

is perceived indicate the need for a review of ways for supervisors and students to communicate and interact, including through information and communication technologies. However, and despite the changes noted above, the most common model for RHD supervision is still via face-to-face interactions between student and supervisor. So, the current and promising role of ICTs in supervision also needs researching, especially since ICTS have the potential not only to extend but also to transform supervisory practice.

This paper argues the following: firstly, that information and communication technologies (ICTs) can provide more flexible ways for RHD students to interact with their supervisors and gain access to resources; secondly, that we need to know more about the nature of possible ICT mediated interactions and the transformative potential to inform usage; and thirdly, that activity theory provides a useful way to research these issues.

Changing context of supervision

Supervision is a thoroughly complex activity, related not only to expertise, resource and time availability but also sensitive to the cultural contexts and traditions in which it is embedded. The nature of the supervisory process and the community and contextual factors that impinge on it warrants further investigation. Tertiary educational institutions usually establish policies and procedures relating to research higher degree (RHD) supervision. Duties and expectations of the supervisor are well documented along with expectations of the student. However, there would appear to be a gap between official documentation and the actual practice itself. As Donald, Saroyan and Denison (1995) observed, while policies and procedures do exist, the importance placed on the different elements varied across discipline areas and departments. Other researchers support this view (see for example, Holdaway, Dubois, & Winchester, 1995; Johnston & Broda, 1996; Parry & Hayden, 1999).

Several researchers also note the increase in part-time enrolments for research students (see for example, Evans, 1998; Godfrey & Mavundla, 2000). Supervisors may well find they are dealing with students who are older and are managing work and home lives as well as their research. As well as resourcing staff members, faculties and departments must provide adequate support for research students. The issues of providing desk space, access to facilities including the library and so on often are not questioned. However as Evans (1998) argues, resourcing part-time students is not straightforward, with some of the burden of support often falling to their employer. Cost savings (for example, travel to meetings) could be used for alternative forms of communication with the supervisor (e.g., using email). However, Evans (1998) argues that these alternatives should not be considered as inferior to face-to-face contact, but rather should be integrated:

> The development of computer communication facilities can provide part-time, off-campus students with opportunities to email, participate in “conference” discussions with their peers and colleagues, interrogate library catalogues and databases, and receive documents. Such computer-based approaches can create a “virtual” community of postgraduate students where the walls between departments, disciplines and faculties are invisible. Supervision supported by email communication allows both supervisor and student to be more independent in terms of their physical and temporal spaces. Such approaches are qualitatively different from the traditional supervision experience; however, there is sufficient research in computer-based uses in open and distance education (Mason & Kaye, 1989) to suggest that, rather than these approaches being “second best” means of supervising and supporting postgraduate research, they

may represent a better means, and one into which on-campus students might well be integrated (Evans, 1998, pp. 80-81).

Information and communication technology in thesis research

ICTs have great potential for improving productivity, facilitating information management and communication, and transforming research training in thesis research. Examples include: personal productivity tools such as word processors and graphics tools; bibliographic databases; statistical and qualitative data analysis programs; email and file transfer protocols; internet search engines, conference facilities and virtual advisors; as well as older technologies such as audio and video recorders, telephones and faxes.

While there has been an increase in research and evaluation of the use of ICTs to improve teaching and learning in schools, and some similar initiatives in the tertiary sector, there remains little research relating to the role and use of ICTs in the supervision of RHD students. For example, in an extensive study of *PhD Students' Evaluations of Research Supervision,* Marsh, Rowe and Martin (2002, p. 314) note that "at the PhD level, there is little research into the systematic use of student surveys to evaluate the quality of PhD research supervision and, apparently, no research that attempts to compare effectiveness across large numbers of different universities". These authors (H. W. Marsh et al., 2002, p. 314) proceed to:

(a) describe the extensive development of the Postgraduate Research Experience Questionnaire (PREQ), which is designed to measure the extent to which PhD and postgraduate research students have satisfactory experiences in relation to the quality of their research supervision; and

(b) to evaluate the usefulness of ratings by PhD and postgraduate students' evaluations of their postgraduate research and supervisory experience for making benchmark comparisons across universities and academic disciplines.

The Postgraduate Research Experience Items relate to the Supervisor, Skill Development, Climate, Infrastructure, and Thesis Examination. The only statements within these item categories which related directly to ICTs were under the heading of "Infrastructure" where subjects were asked to respond to the statement, "I was given good access to computing facilities and services". Clearly this statement, in referring only to access to ICTs in PhD supervision, falls well short of seeking information about how those facilities are used.

It could be argued that the use of ICTs might be implicit in other statements, such as "My supervisor/s provided helpful feedback on my progress". For example, that feedback might be in the form of attachments using email, or "track changes" in Word documents. In their paper, Marsh, Rowe and Martin (2002) do not explicitly address ICTs. They do not explore or suggest that the relationship and communication between the PhD candidates and their supervisor/s might take into account new possibilities being provided by ICTs.

As Heath (2002, p. 41) points out, the success of the RHD supervision process "depends heavily on the supervisors, for they must provide the expertise, time and support to foster in the candidate the skills and attitudes of research, and to ensure the production of a thesis of acceptable standard". In his study, which obtained data from questionnaires completed by 355 PhD candidates submitting theses at the University of Queensland, Heath attempted to gain data which could be used to enhance the quality of postgraduate supervision. In the framing of

the questionnaire, this study also revealed similar shortcomings to that of the Marsh (2002) PREQ items in that there was no provision or acknowledgement of the implications of new ICT mediated supervision strategies. Heath (2002, p. 52) in his concluding remarks, for example, reports that "data indicate clearly that regular meetings, coupled with constructive guidance on topic definition, research design and data analysis, literature and scholarly writing, are central to candidates' satisfaction". His findings focused only on formal face-to-face meetings with supervisors, publications and conference presentations.

Thus, both the Heath (2002) and Marsh et al. (2002) investigations are limited in the recognition of the changes occurring through ICTs and the implications of those changes for changing the traditional structures and processes for RHD supervision and research training. Therefore, there is a sense that both approaches tend to measure and improve current forms of organization, rather than transform it. A different research approach that is more transformative in outlook is warranted.

Hearn and Ninan (1997) argue that organizations maintain a continual tension between self-referencing and self-organizing properties during the course of their evolution. They refer to Malik and Probst's (1982) earlier conception that self-organization is an approach whereby a system tries to adapt to environmental changes, as opposed to its own self-referencing system ability, which tries to preserve its original nature or identity. Consequently, the point of change for organizations comes when environmental pressures make it difficult to sustain the current ways of organizing. Hearn and Ninan (1997) refer to the advent of ICTs as creating a "new environmental turbulence" which they see, in the current phase of ICT diffusion, as facilitating "frame-breaking and self-organising into the new patterns of organizational functioning required by environmental turbulence. ICTs may facilitate variety, diffusion, juxtaposition and sense making … Converging ICTs have changed the complexity that organisations now face" (Hearn & Ninan, 1997, pp. 106-107). A different research approach that seeks out tensions as a handle for change is advocated in this research.

So, given the changing nature of postgraduate research experience and the environmental complexity of the context in which it is occurring, how can the supervision process be improved? The answer would seem to be in gaining a better understanding of the "environmental turbulence" to which ICTs contribute and utilizing the underlying tensions and contradictions as a lever for transforming the organizational functioning.

Activity theory

In this paper, it is suggested that RHD supervision as mediated through ICTs can be better understood and transformed through the application of cultural-historical activity theory (CHAT). Engeström (1987, 2001), basing his work on Vygotsky (1978) and Leont'ev (1981), depicts the structure of a human activity system as shown in Figure 1. The activity system includes a meaningful context in which human action is situated and shared as a community of practice. In this generalized depiction, activity is directed to an object, which Stevenson (2004) refers to as an object(ive), since it is central to the motive of the activity. The outcome of the activity system may lead to transformation of the system through what Engeström (1994) calls expansive learning. Therefore, an activity theory perspective can contribute to understanding by not only providing a frame for describing and analyzing (visibilizing) supervision practice, but also of transforming that practice. In the process of describing and analyzing using an activity theory perspective, attention is drawn to tensions and inconsistencies in the multiple perspectives of participants. These tensions provide levers

through which transformation of practice can be facilitated. This general perspective of activity theory is applied to ICT mediated RHD supervision below.

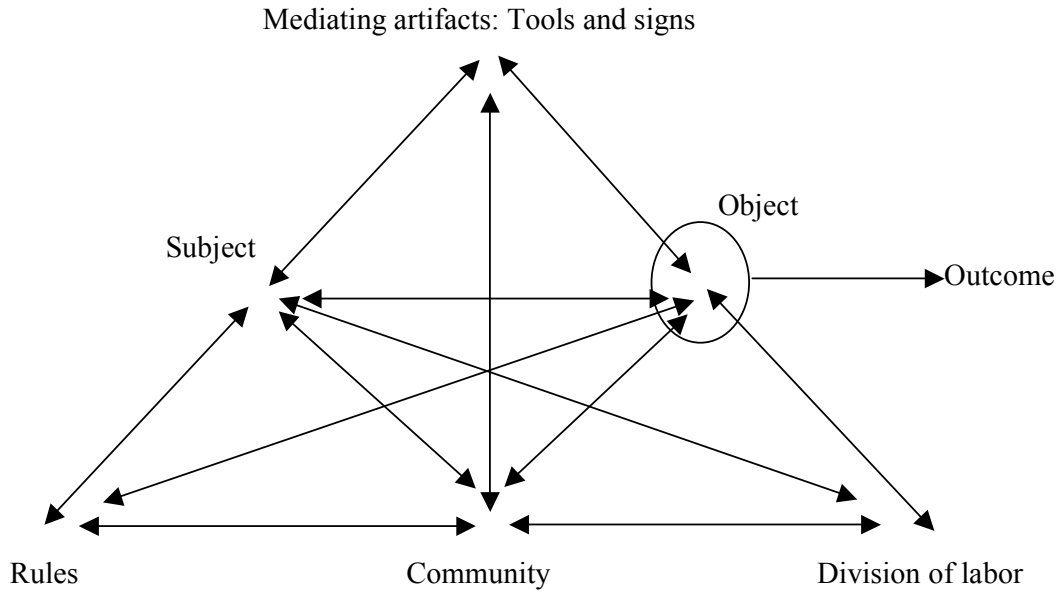

Figure 1: The structure of a human activity system (after Engeström, 1987, p. 78)

The current research focuses on how research supervision might be improved and extended through mediation by ICTs by conceptualizing the activity in terms of CHAT. The *object* of this activity system is related to the central motive of developing an independent researcher. The *outcome* includes the learning of research skills and domain knowledge, as well at the award and publications that may result. *Subjects* include both the student and supervisor who contribute to the research project that is mediated, not only by ICTs and other tools, but also by the rules and *community* in which the practice is situated. Examples of *rules* include academic conventions and publication formats and the community where the *division of labor* is distributed among specialists that may include librarians, statisticians and technicians.

In previous research into higher degree coursework and supervised research, tensions have been identified that will be explored in the next phase of the current research. Those tensions which have a bearing on ICTs include: communication and language issues (Taylor, O'Connell, & Radloff, 1998; Wisker & Sutcliffe, 1999); face-to-face versus ICT-mediated consultations (Ellis & Phelps, 1999; Ewing, 2000; Jenlink, 2001; Mahoney, 1995; Stacey & Fountain, 2001); research training versus research output productivity (Squires, 1998); student independence versus structuring and project management by supervisors (Crawford et al., 1997; Styles & Radloff, 2000); full time versus part time candidature (Burns, Lamm, & Lewis, 1999; Evans, 1998); and resource availability to staff and students (Latona & Browne, 2001; Malone, 1998).

Conclusion

This paper argues that information and communication technologies (ICTs) can provide flexible ways for RHD students to interact and access resources. It also argues that more research is needed into the nature of ICT mediated interactions and their transformative potential. Finally, it argues that activity theory provides a useful way to research these issues. While activity theory is not specific about the kinds of data gathering and analytic methods to

be employed, there is clearly a need to explore the cultural context and historical underpinnings of supervision, as well as current practice. These data will be collected by interviewing staff and students and by searching paper and web documents. As well as mapping the main elements of subject, object, outcomes, tools, rules, community and specialization, critical incidents and contradictions will also be sought as leverage points for transforming practice.

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