

TECHNOLOGICAL LITERACY: EMOTIONS AND ARTEFACTS IN PROFESSIONAL LEARNING

Symposium of Three Papers

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INTRODUCTION

In this symposium we shall present preliminary results from the TECHNUCATION project – a project designed to specify and answer questions about how professional bachelor programmes can provide skilled practitioners capable of using and driving technological innovations (such as robotics and skills labs) within the welfare sector. Our starting point is field studies of everyday socio-material relations with technologies, which we argue influence the learning and practice of teachers and nurses. We shall in the symposium explore how technological literacy - the ability to use, manage, assess, and understand technology – can be furthered in professional education. Based on results from qualitative research methods we shall specify questions concerning professionals knowledge—both factual and conceptual understandings of technology, capabilities—how well a person can use technology—problem solving through design thinking and critical thinking and decision-making—one’s approach to a technological issue. A hypothetical answer to the specified questions raised by the Technucation project is that it is possible to develop a refined concept of technological literacy including the often tacit practice-based learning and furthermore that these new theoretical insights can be made of use in new educational tools created on the basis of new research based knowledge of how employees learn to understand, use, tinker with, innovate or reject technology in their everyday work life. We shall discuss such an improved framework for enhancing the technological literacy of future employees in the public sector and how to prepare them better as drivers of technological use and innovation in the welfare sector. The specific material to be presented is concerns the use of skills labs in Danish Nurses education and the emotions they elicit, what can be learned about professional identity the use of an emotional robot in nursing homes and finally how shifting between artefacts become material engagements.

Symposium Paper One

AGENTIAL ARTEFACTS: TOWARDS A RELATIONAL TECHNOLOGICAL LITERACY IN TEACHERS AND NURSES' PROFESSIONAL WORKPLACE CULTURES

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Technological artefacts are increasingly changing professional work lives, and understandings of professional identities as well. With a point of in departure in a Danish project on the effects of technology on nursing and schooling I shall argue that a technological literacy is needed which take into account the active agency of artefacts. In the project Technucation we find that technologies are not just tools helping professionals to do their work, but actively engage with the staff in changing their professional cultures. Professional staff on the other hand is often passive in their engagements with technology. Relations are conceptualized as concerning other people (pupils or patients) not technologies. I understand technological artefacts as products of human cultural-historical processes (Cole 1996, 124). This cultural theory of artefacts places artefacts between culture as cognition (embodied agential knowledge) and culture as agency (agential materiality). Combined with a postphenomenological and ANT-inspired approach we can argue that cultural-historical artefacts transform our being-in-the-world. It is through artefacts the workplace culture, and its practitioners, is formed and transformed. I shall discuss the kind of relational technological literacy needed in professional work in order to be able to grasp and relate to the changes technologies are creating in professional life. In order for teachers and nurses to become active innovative drivers of their professional work we may support a change in the passive approach to technological innovation and strive for a technological literacy which confront the active agency of technology as it unfolds in present day work life with a notion of relational agency (Edwards 2005). Technological artefacts are not just helpful tools in professional lives. They are active change-agents in relationships and need to be understood in this capacity.

Hospitals and schools are filled with technological tools. At the hospital, nurses will find the right records about the patients through a specially developed computer system; they use electronic 'droppers', dynamic beds, electronic blood pressure measurement apparatus and small handheld computers (PADs). At the schools we also find new computer systems connecting parents, pupils and teachers, we find interactive white boards with numerous new software features, copying machines, movie cameras and it's becoming increasingly common to include students' cell phones in teaching.

Technological artefacts can be broadly defined as a meaningful phenomenon, linking tangible tools with thoughts, actions and culture associated with the everyday routines of our local life-worlds where technology helps to define our relationships and generate opportunities in this life-world (Kim and Roth 2008). Technologies are not just helpful, but 'bite back' and have 'unintended consequences' (Tenner 1996).

I shall follow the educationist, Anne Edwards, who in the analytical field of cultural historical activity theory have called for theories of what she names 'relational agency' rather than systemic theories, which demand that the researcher is stuck with the whole theoretical package. Relational agency involves a capacity for working together; a "capacity to offer support and to ask for

¹ Part of this paper build on work developed with Oliver Tafdrup, student helper in the Technucation project.

support from others” (Edwards 2005,168) . Where Anne Edwards is discussing this capacity in relation to humans engaged in activities, I would like to include technologies in the definition. Relational agency also involves a capacity to work with technology, to demand that the technologies offer support and to ask support from others if technology fails. Including those who make and distribute technologies. Relational agency can serve different purposes at different points in professional learning but it always includes: “the capacity to ‘know how to know who’ (can collaborate)” (Edwards et al. 2010, 31).

Understanding technology is in this perspective open for an understanding of how the technological artefacts engage in relationships and create opportunities related to the purpose of the professional work. In this paper I use a diffracted reading of post-phenomenological and cultural-historical approaches to create a model of analysis in an exploration of what characterizes the way professionals relate to technological artefacts in the work they carry out.

Technology can be defined in numerous ways in attempts to specify technological literacy (e.g. Dakers 2006). My starting point is the professionals own technological literacy as it emerges from an analysis of empirical material in the Technucation-project (www.technucation.dk). I shall in this paper draw on 279 quotes about 'artefacts' pulled out of a database Technucation-project's interviews with 34 nurses and teachers, and field observations from six health departments and four schools. From this material, analysed with student helper in the project, Oliver Tafdrup, we have been able to establish a typology that divides the professional teachers and nurses responses in the Technucation-material into four main groups: the active-positive, the passive-positive, the active-negative and passive-negative. From this typology, we discuss the common challenges teachers and nurses are faced with when using technological artefacts in the workplace (Tafdrup and Hasse *forthcoming*). There are some differences between the two groups of professionals (teachers and nurses), which might be explained with reference to the various functions of technology in the two professions very different lives. For the purpose of this paper, however, I shall underline the general features of the typology. The technological literacy I shall propose based on this model is a *relational technological literacy*, which considers both the positive and negative ways, and the active and passive users of technological artefacts.

Technological literacy and artefacts

A lot has been written about what technological literacy *should* be –primarily in the educational system (e.g. Garmire and Pearson 2006). We have a bulk of research relating to how specific technologies engage with nurses and teachers work life (e.g. electronic patient journals and didactic improvements for interactive whiteboards), but very little empirical work has been done to understand the technological literacy as it unfolds in everyday life – and especially professional lives.

The first two questions in our questionnaire in the Technucation-project were intended to evoke the professionals' own formulations of what they mean by technology. They were respectively:

"Explain what technologies you see as the most needed in your daily work?"

And

“Name the 3-5 technologies that, from a professional standpoint, are the most needed in your workplace and explain why it is? ”.

Respondents had the opportunity to mention all sorts of tools relevant to their work, including books, pencils and paper. Yet it is a common feature that the professionals refer to electronic artefacts, and preferably the very latest, when they relate to the concept of technology.

Nurse1: “Well, I would answer ‘the computer’ because you use it all the time.”

Teacher3: “Technologies? There is of course the computer, right? It is a working tool as well as a planning tool.”

When 34 nurses and teachers are asked to name the three most important technologies in their working lives, they point to things that are either run on current or batteries, such as computers, their software systems, interactive whiteboards and electronic defibrillators.

Although both teachers and nurses used books, paper and pens, seen in notes from participant observations and they also refers to these devices in our interviews, these are rarely mentioned as examples of technological artefacts.

A teacher for example, was asked whether there are situations where he has available technology, which he choses not to use?

Bosch: “Yes, in my math class (...). We have a book system here at the school, which we have agreed that we use, and I cannot bail out of that system and then do something else. (...) We have an agreement that we **MUST** use the books, we have here at school. And the books we have, they are not connected with IT training with computers.”

Using books is described as a rejection of technology. Technology is characterized by being 'electronic' IT and computers.

The electronic technological artefacts mentioned by informants can be subdivided according to their functions in the two professional groups. Of course there are big differences in the technologies highlighted in the respective teaching and nursing professions, but the computer is the single item most often cited as a prototypical example of an enabling technology in both disciplines.

Some tools are associated with a particular task, others like the computer, are often mentioned and are used by both nurses and teachers in many different contexts.

Many highlight the computer's specific software programs that make their work more efficiently. For example systems which make it possible to follow patients blood glucose monitoring or follow students' work. The computer and its programs are highlighted as an advance in so far it provides oversight, and make planning and work smarter and faster. But it is also highlighted as one of the biggest problems for developing capable and efficient workflows. Some mention how nursing formerly could easily be done without electronic technology, but today it has become a problem when the computer systems break down.

Nurse 5: “We had a power fall out half a year ago because there was a fire. For half a day we had no power. When that happened we were, to say the least, in big trouble. Because our records are all in our computers, the blood tests are all in our computers, as well as our registration system that indicates whether the patients have come from the outpatient clinic. All is located on the computer. And since there was nothing that worked, our day was absolutely strange. (..) If the power is down, we can actually do nothing at all.”

Many refer to the wasted time they spend on systems that do not work:

Nurse 2: "I think technology creates problems in everyday life. Sometimes we are really, really, really busy and have very, very many patients. And it is so frustrating that we must wait because there are some computer systems, that do not work or there are some PDAs that do not work - it makes everyday life much more difficult. I think!"

Other refers to computer crashes or problems with logging on, but the professional rarely signify that it is problems they themselves can or should do something to solve. They agree that the tools do not work and they may also agree that management is not doing enough to ensure that problems with technological artefacts are solved. But they do not demand changes. Even the above mentioned nurse:

Nurse 2: "And how are we to solve it? (PADs and computers breaking down). We could purchase some systems that work. You know, we never hear about computers crashing at big private companies, right?"

Many, both nurses and teachers, refer to systematic break downs of the systems. Instead of demanding better systems, the majority of teachers and nurses have developed 'emergency systems' and have prepared a plan B in relation to the crashes, both groups regularly are experiencing. It is an integral part of the professional technological literacy, that technology is associated with something that could, and probably will, collapse and that professionals must prepare for break downs. The technological literacy, however, is not connected to understanding how to solve the problems created by the prevailing technologies and the relational effect they have on work life.

Some electronic technological tools are perceived as particularly useful others are considered impractical or even dysfunctional in the working situation. It is primarily the new electronic artefacts that appear as a source of either pleasure or frustration in everyday life. However, most often without reflections on the required improvements, if technologies are not working as they should according to the professional. Conversely, some electronic tools are highlighted as improvements over the past use of non-electronic aids, but rarely with any deeper reflection.

Understanding technology - the professional technological literacy as it plays out in everyday work-life - is, in the professionals' own perspective, based on how to handle new and electronics-based technologies, which appear almost like the weather forecast. Sometimes it rains and you have to prepare yourself with umbrellas, sometimes the sun shines and all is fine. The weather come and goes and you have no influence on its coming and goings whatsoever.

Typology of technological literacy

A common feature of some professional's technological literacy is that the electronic-based technologies are considered an inevitable evil. Other has a positive relationship with the electronic technologies, and also believes they have an active influence on how they enter and influence the work life. They reflect on the new opportunities and on how the technologies hold potential for change. Others have a passively accepting relation to the new electronic artefacts and their presence in the workplace. They reflect on the problems with these technologies, but are not actively seeking new solutions. These considerations arise from our systematic perusal of the 279 citations. These show that through a contrasting analysis approach (Hasse and Trentemøller 2009) is possible to divide the professional technological literacy in two pairs of opposites: active-passive, positive-

negative, which provides four main categories of technological literacy (same person might express several kinds of technological literacy in the course of an interview).

This can be illustrated visually in the form of the following matrix:

	Active	
Negative		Positive
	Passive	

Active-passive variable describes the practitioner's approach to technology. This is active when the practitioner makes a reflection in relation to the technology that goes beyond the technology's own range of transactions. The technological artefact is in this case transparent and open for reflective consideration of whether a technology is useful in a situation, and possibly why or even how the use of technology can be improved by changing the relationship – either by changing the technology or the staff. The following teacher actively complains that the staff has not received proper instructions to make proper use of the interactive whiteboards in schools, and that it is a waste of money not investing in the improvement of the staff instead of just buying new technologies and he has the following arguments for the management:

Teacher 9: "It (the interactive whiteboard) has not been properly implemented. It may well be we that we now have an interactive whiteboard, but the teachers are just as often using it as a projector screen, right? "

This teacher is reflecting upon the relation between the potentials of the interactive whiteboards and the potentials for the developing of the work with the students, which could be improved if the local teachers learned more about how to engage with the technology.

Conversely, the passive user of technology has an unreflective habitual routine use of technology and deals with the tool on the technology's own premises without any assumption that it should call for reflections about the relation between work and technology. From the coded quotes, but primarily from field notes, we note that tools such as books, paper, established well-known computer programs and other new electronic technologies are used unreflective in everyday life. It is especially when new technology is introduced that reflection occurs because these technologies require a learning process which may 'disturb' the professionals in their routines.

New technology is ipso facto ready-at-hand as new opportunities in an otherwise routine-like job. Passivity covers here, whether this new opportunity gives rise to reflections on the tool relative to intentional purpose of the work or not. This passive approach will, among other things, be expressed when the practitioner relates to the implementation of new technological artefacts without examining or reflecting their usefulness for work:

"Int: And what about something like these laptops you have mentioned and things like that? How has the process been with it?

Teacher 16: "Well, we just get them then. The school chooses to buy them, depending on the economy. We get them because the school either buy or receive them. "

Positive-negative variable describes the practitioner's way of perceiving the technology in relation to the work with patients or pupils. This is labelled as 'positive' when he or she can see the meaning of technology in relation to the situ prepared professional practice.

Nurse 20: "When we look at what is being documented, it is many times better than before (with the computer). Also for patient safety, because we can always follow the patient now and see how much medication they receive and how their blood pressures swings up and down and everything. "

The reverse is coded as 'negative' when the technology is perceived as a foreign body that is pressed from into work from above or outside, and is not considered to contribute to the in situ prepared professional practice. This also applies when the technology is perceived as a disturbing element in the life-world of practice which does not contribute to patient care or work with pupils in an appropriate manner:

Teacher 7: "So, shortly after (we bought the new computer) we experienced a huge crash in the municipality. This means that everything running on IT was largely pacified. That came on top of a year when it had actually been pretty bad. The teachers (used a lot of time preparing) and showed up with their (prepared lessons) on a USB-stick and then it did not work when they come over here, because they could not get online, or because they do not log on to those machines. "

The active-positive technological literacy relates to the nurses and teachers who actively and positively ensure that the technology is used appropriately in the relationship with the pupils or patients:

Nurse 4:"I remember it was fun in the beginning, when we had introduced (the computer screening), because we always apologized each time we used it ...to the patients: 'Excuse me. I have to look into the screen' (and not at the patient). Now we have arranged it so that the screen is slightly to the side, so you still have contact with the patient."

This nurse has, like other nurses and teachers, a positive understanding of the technologies that is considered a help in everyday life. But many times, the enthusiasm is not followed by reflections on why technology is good relative to the intent of the work.

There is almost no one in the data material that corresponds with an ideological opposition to the technological artefacts. Even so there are some technological artefacts that receive negative-active considerations.

Interviewer: As long as you are 100% confident that there is a match between the patient and the medicine, then you do not need it [the PDA]?

Nurse 5: No. We could see the idea with it, if it was easy to use and did not cost us a lot of time. Then it would indeed be smart to use as an extra precaution (...). But in a busy life, when it costs a lot of time (we take from the patient), we choose to leave it out and rather do the work without it. "

The passive technology users

Most teachers and nurses, however, expresses a passive relationship to the technologies, whether they perceive them positively or negatively.

Nurse 2: "When you consider becoming a nurse, you will certainly not connect nursing with something technological. But you really use a lot of time, for example on computers, and I do not

think that I thought (...). It can take a lot of time from the patients. And I think that I was a little surprised to find out how much time you really spend on technologies.

Interviewer: How does that affect the way you think about yourself as a nurse?

Nurse2: "I just think that we accept it and think that it is the way we work around here."

A teacher with a passive technological literacy notes that because the school now has acquired the interactive whiteboards, so teachers are compelled to use them:

Teacher 4: "Yes, we do have our interactive whiteboard. I use it, because we have it. And it's lovely. But it also gives a lot of problems because it often breaks down. But I use it because I'll have to use it, in order to keep up..."

Another teacher has a passive-negative relation to technology.

"When I started as a teacher, it was quite clear that the phone was the most important technological tool because I could call the parents if there was anything urgent. Now we have gone over to the computer world, so now it's the new media. But it is not because it suits me. So eh, now it is just the way it is."

For the passive users technologies are either incorporated as new daily embedded routines or are accepted without any reflection on their necessity in relation to working life. The passive user can also experience that the technologies come to the fore, as 'disturbing' or as something that interferes with earlier routines. Technology is not something they have asked for or even asked to be introduced to. Few have a clear sense of why the technological artefacts were introduced in the workplace and by whom, but most people guess on the local IT departments, the local municipal authorities or the management as the responsible.

A teacher believes for example, that decisions about implementation of new technology were "purely municipal. We had some computers available. I have not had any influence. I have been crammed into it. "Another says: "It's not that we have been involved, at least not the ordinary teacher. So it may well be that IT advisors have been involved, but we have not (...) as I said, it's not something we have been informed of - the reasons for it. "

The passive technological literacy manifests itself here in that the informants did not express that technology is something they want to change or be involved in. Technology is like the weather, something we must endure, which comes when it comes. As one nurse put it, it can irritate, that you should spend time on the computer rather than patients. When asked whether she is considering opting out computers and prioritize patients, she notes: "No. I must prioritize the computer." Technology goes beyond the relationship with patients. "We are very far away from patients. I have not necessarily seen the patients, I am responsible for. I know them only on paper or screen" Despite the fact that we are here presented with the notion that technology harms the 'core service' - the patients – there is no active de-selection of technology (contrary to the example with the PADs).

Cultural routines

In the analytical approach used to develop and analyse the above typology I shall draw on a number of theories relating the relationships between the agency of material artefacts and human agency. Whereas we are used to understanding humans as having agency, the understanding that things can have agency in professional work life have only emerged recently – not least inspired by the work of Bruno Latour (e.g. 1987, Law and Hassard 1999) and taken up in postmodern discussions of

technology (e.g. Verbeek 2005, Ihde 2002, Hasse 2008) as well as in educational studies:

“Things exert force themselves. They do not just respond to human intention and force. In fact, things change and shape human intentions, meanings, relationships, routines, memories, even perceptions of self. ... To view things as either the products of human design or as brute tools controlled through human action alone is to underestimate the power and contribution of things themselves in enacting events. It is to overlook the complex effects that these non-human entities produce through associations with other (human and non-human) things.” (Fenwick and Edwards 2010: 6)

The analytical approach I use in understanding the Technucation-findings does not leave it to the things themselves to exert agency. Materiality, like machines and humans come into being in engagements with each other (Suchman 2007) and these engagements are not just to be understood as networks, but as cultural life-worlds. To understand the significance the agency of artefacts have in the professional life and the professional relationships, it is necessary to understand what Karin Knorr Cetina has called “the frames of meaning’ within which people enact their lives” (Cetina 2007, 364), which we might call cultures (Hasse 2008). She suggests with reference to phenomenology that these important ‘framing’ structures present a 'life world', which refers to the importance of specific artefacts and the incorporated use in a daily life as "material regularities', which interacts with the relevant structures. This approach:

“suggests rich and potentially complex internal environments with warped geometries resulting from their turning or curving in upon themselves, and a tendency to impose and expand their own structures and concerns” (Cetina 2007, 364)

Technologies may be “evocative objects” (Turkle 2007), but what they evoke belong to the relations formed in life worlds. Although space does not permit detailed studies of nurses and teachers in situ prepared life-worlds, the above typology point to the complexity in relation to the way artefacts can be understood in a life-world.

Our typology reflects how teachers and nurses 'get involved' - or become 'entangled' with technology in what we with an analytical cut could call the life-world of (Danish) professionals. This life world spans across organisational border (though a more refined analysis will show the differences between teachers and nurses life worlds).

It is however a cultural life world, because we through the method of culture contrast could find many other life worlds with different frames of engagements with technologies (e.g. engineers and physicists). In other life worlds referred to in the STEM-literature (Science, Technology, Engineering and Mathematics) technology is understood in a more transparent way as something you can learn to handle, understand and invent (e.g. Garmire and Pearson 2006). The references to the normative technological literacy in demand in science refer to active users who are not passively accepting technologies as nurses and teachers (and of course there is also a gender dimension here, which we will expand on later in the Technucation project).

In a cultural-historical perspective actions are tied to activities connected with motives (Engeström 1987). The advantage of this approach is that we are made aware that technological literacy must include an awareness of the motive behind introducing the technologies.

The weakness of this theoretical approach is that artefacts are typified in relation to the motive of

activities, and thus often present themselves as passive tools, rather than active change agents with the capability to change motives.

Within the cultural historical theory artefacts are discussed in relation to working life as primary, secondary and tertiary artefacts (Wartofsky 1979). Primary artefacts are those used directly in production (such as axes, syringes, and computers). The secondary artefacts refer to representations of primary artefacts created and used in connection with the use of the primary artefacts. Secondary artefacts both external representations, like manuals, and the internal signs referring to the primary artefacts and their use. The tertiary artefacts break away from these representations and refer to the 'free play' and (artistic) creative thinking about primary artefacts. Such artefacts have lost their original frame of reference as 'representations of the ways to act' because they are completely detached from "their use in productive praxis" and from their "direct representational function" (ibid. 201-202).

The Finnish learning theorist Yrjö Engeström has further developed Wartofsky's perspective through a specification of the types of artefacts (Engeström 1990). Primary artefacts are 'what-artefacts' which refer to the material tool used in human activities. The secondary artefacts are divided into two: how-artefacts and why arte-facts. How-artefacts refer to the routines and procedures that tell us how we should handle a particular tool in relation to a particular activity and the representation can be both external and internal. How to use the little mini-computers, called PADs, our informants refer to - are written as manuals and people also have their own personal internalized embodied routines learned through daily use of PADs. The second type of secondary artefacts called Engeström 'why artefacts'. This type of artefact refers why we should use an artefact. Here the tool to be used in an activity has come into prominence and made possible a selection of artefacts for the task at hand. Nurses can for example choose artefacts in relation to a professional model they have over a specific 'disease' that then govern the selection of the relevant artefacts (Engeström, 1990, p 183). The third type of artefacts Engeström identifies as 'where-to-artefacts'. As Wartofsky's tertiary artefacts they go beyond a statement of 'why' an artefact is useful in a particular situation. The tertiary where-to artefacts appear as projections, visions of the future that may require the innovative development of new types of artefacts.

Neither Engeström's nor Wartofsky's artefacts have an own agential effect in relation to the practical work to be done, even though tertiary 'where-to' artefacts may focus on a break with the habits and routines in a future perspective (Engeström 1990, 194-195).

What these typologies of artefacts are missing is a relation to a typology of users embedded in social and cultural contexts.

One way to explain how things exert power is to emphasize how material things are spun (entangled) into coherent clusters of meanings that indicate their use in relation to intentional acts in life-worlds (Hasse 2011). Artefacts get what you might call 'directive force' in the professional culture linked to how "a culturally constructed world encourage people to action" (Holland et al., 1998, 99).

Even if a teacher is in doubt about the usefulness of using interactive whiteboards, the board is spun into a network of connections (it is 'creative', 'innovation', 'in the school spirit' etc). To break these connections, and go on using the blackboard, would position the teacher as someone who is against progress, innovation, creativity and the school spirit. The consequences are unfortunately that motives are not questioned and that the agency of technologies is enhanced even when it threatens the leading motive of the activity (to improve conditions for patients/pupils). In silent and embodied

ways technological artefacts are transformed from useful tools to radical change agents and in those same movement nurses and teachers professional considerations of how technologies improve or deteriorate relationships with patients and pupils are pacified.

Artefacts may be primary, secondary or tertiary but that does not tell us about their agential entanglements in complex life worlds.

A simpler way of looking at artefacts, whether they are primary tools like computers, secondary tools as manuals or tertiary visions of the future is to distinguish between artefacts as tangible objects (computer, manual and book) and the meanings we learn how to attach them in social and cultural organizational life-worlds. Artefacts are in this sense undergoing constant reconfigurations of relations between materiality and importance attached to the cultural learning processes, which also forms the professionals' understanding of themselves over their working lives.

Technologies are agential and even have the power to reduce humans to passively accept changes in their professional lives they would never otherwise have accepted. But one can always develop a relational technological literacy, which include the ability to question and improve technologies in relation to the motive.

Conclusion

What we can see from the analysis of our empirical data is that some tools in the workplace are perceived as 'technology'. These are the new electronic artefacts. Following this definition the professional in our case-material rarely choose their own technological artefacts. Many find it difficult to make active demands for better or different technologies. We have conducted an analysis of the self-evident relations professionals in our data material draw between the technological artefacts, and their understanding of how to act and react in relation to these artefacts.

Across the material we find that technological artefacts are linked into recognizable cultural patterns. Technology is attributed with an agential force and professionals react in different ways to this, which can be illustrated by a typology of professional users of technology.

Our analysis model seeks to explore the connections the informants themselves point to as relevant to the technological artefacts and their relation to them.

Edwards concept 'relational agency', implies a shift from the system perspective on work activity towards a focus on the collective activities expanding the local activity system. In the book *Learning and Expanding with Activity Theory* the editors sums up Edwards position: "Relational agency is offered as an enhanced form of personal agency and is defined as a capacity to recognize, examine, and work with the resources offered by other practitioners in collaborative action on an object of professional activity" (Sannino, Daniels and Gutierrez 2009: xviii). Analytically we can say that the connection between artefacts and the importance they are attributed in a professional cultural life-world differ from place to place and from practitioner to practitioner.

There are certainly many patterns in the active-passive and positive-negative technological literacy we must proceed with to refine the typology in relation to work-place, work-type, gender, age and education. Just as we keep conducting more interviews in the project.

We are working towards a new relational technological literacy useful for nurses and teachers, which differ from the ones in use among physicists and engineers.

Our understanding of the relational technological literacy includes encouragement of the active agency of humans as well as an awareness of the active agency of technologies. Technologies can change relationships between professional nurses, teachers, pupils and patients. However, professionals can also change relationships between technologies patients and pupils. Professionals must work together to question and refine technologies to meet their needs and motives. In this sense our concept of technological literacy include relational agency.

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Symposium Paper Two

HOW TO BECOME FAMILIAR WITH TECHNOLOGY: CONTRASTING THE NEW AND OLD IN NURSING PRACTICE

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Considering professional practice and technology as being mutually constituted in everyday use, raises questions as to how workers navigate their actions amid the consequences of technological developments. This paper centres upon the ways nurses relate to their experience of new technology through comparisons made with previous procedures and the older technologies employed. Learning to adopt new technologies is explored as a reconfiguration of practice and technology within this comparative framework as a way to provide new insight into the nature of technological literacy found within professional settings. Building upon the accounts of nurses within a Danish hospital their adoption of new technology is addressed in terms of a double movement of a change of practice from 'previous to current' and a coincident change of technology from the 'imposed to preferred'. The arguments made build upon the notion of practice as a form of 'way finding' amid the alternatives posed within the sociotechnical conditions rising from the implementation of new technologies.

Not knowing how to operate a technological device is a common experience that most people have encountered. Even though we could define technologies in different ways, not knowing quite what to do next when faced with unexpected responses or unusual circumstances leads to a sense of being disoriented and uncertain how to proceed. This applies equally to the world of work as it does in general for our everyday lives and finding out how to use technologies allows us to resolve situations and complete goals. When technologies and situations are familiar then we generally know how to proceed and in which directions we must head. Without past experience and learnt procedures reaching satisfactory conclusions within working life would be at best baffling and frustrating, not to say hazardous and upsetting.

Working practices aren't simply recurrent actions but are emergent in nature. They provide structures through which procedures can on the one hand become "*routinised*" (Eraut 2000) and on the other allow us to identify and perceive ways to diverge from our current position to preferred future ones. Skills and knowledges support this giving a kind of projection of how to understand a situation, acceptable reactions to it, and likely consequences. In other words becoming aware of the alternative paths available and where they might lead.

Although justifiably introduced as a benefit to working procedures there is nevertheless a perpetual deviation between the situated actuality of practice and the significance of deployed technologies. While Ackerman (2000) terms this the "*socialtechnical gap*", Paul Dourish (2006) describes it as the discrepancy "*between our technological "reach" in the design process and the realities of technologies-in-practice*" (Dourish 2006: 6).

Finding the preferred pathway becomes problematic for workers unfamiliar with how newly introduced technologies, whether seen as imposed or not, will change practices. The complexities of work become compounded by the uncertain consequences that increasingly integrated technological systems have upon the objectives of practice. Technologies that if not capricious in effect then certainly increasingly subject to redevelopment and redundancy.

If the fundamental ambition of technological literacy is to offer people a means to "*engage intelligently and conscientiously in the world around them*" (Yawson 2010: 5) then what might it provide the uncertain practitioner when faced with the need for changing procedures? It is supposed that learning how to operate a new technology means learning how to adopt it for the benefit of practice?

In this paper I will assert the contrary, that there are no simple connections between the use and outcome of technology and that this mistaken view prevents an adequate foundation for the kind of learning that is rudimentary for technological literacy.

Seeing technology as simply providing disconnected and rationally controlled outcomes effectively treats the world of work as a predictable place involving a "*fixed set of known alternatives based on stable goals, purposes and values*" (Klein et al., 1993 quoted Kellner 2000: 249). We need to consider technologies not as detached or having generally accepted effects but rather as "*technologies-in practice (enacted technology structures) that are recurrently produced in everyday action*" (Feldman & Orlikowski 2011: 14). From here the consideration of alternative pathways becomes not simply the reflective practice of work (Schön 1983) but a defining character of technology itself.

By considering the ways that professional nurses orientate themselves amid technologies-in practice, I shall show how technological literacy is aligned to learning how to identify and draw distinctions between different ways of acting with technology. This reconfiguration refers both to the pragmatic and tacit choices occurring during the unfolding of situated procedures as well as their projection towards the changing demands of technology and practice. In other words alternative pathways within the here and now as well as those seen either in retrospect or in preparation for tomorrow's needs.

In my selection and following treatment of empirical data I deliberately underscore the historical aspect to practice "*viewed as central for understanding how knowing and learning emerge in practice*" (Nicolini et al 2003 quoted Svabo 2009: 362). Emphasising the temporal nature of practice provides a viewpoint from which to draw comparisons between newer and former procedures and the technologies involved. This follows conveniently from the narrative accounts and conceptions given by practitioners themselves and importantly for the purpose here it frames their experience as one built upon prior experience and therefore coincident with forms of learning.

As a rule, nurses like other professionals such as teachers aren't technologists. That is to say although they may have different attitudes and experiences about the "*need to comprehend and make use of proliferating high-technologies*" (Kahn & Kellner 2006: 258), it remains care that is the primary objective of their professional practice and the underlying focus of their training and one could suspect their motivation. Technologies however are designed, procured and implemented through political, economic and organisational structures that have broader concerns than those found within the day to day of the hospital ward. In this sense, as with the Luddites, practitioners may understandably feel that new technologies are imposed upon what otherwise are taken as adequate ways of working. Skills and practices developed in response to previous conditions must be modified or neglected in favour of more uncertain procedures. Learning to become familiar with new technologies becomes in consequence not simply about their use and management but about how to overcome their imposition. Technological literacy becomes therefore the empowerment to change practice in meaningful ways able to offer expanding choice to the options available for the successful completion of goals.

This focus upon “*processes of empowerment and democratization*” is what Dow recognises as the interpretation of technological literacy at its “*deepest level*” (Dow 2006: 246) and provides in Fourez's terms “*a degree of empowerment of the individual*” offering “*practical ways of coping with specific situations, and negotiating over outcomes*” (Fourez 1997: 906).

Thus, the central argument that I wish to develop here is that technological literacy is a development of scope of possible procedures or pathways that empower practitioners with more opportunities. And during what might be characterised as ‘learning cycles’ there is a corresponding change of state of technology-in practice from the ‘imposed to the preferred’ and of practice from the ‘previous to current’.

The technologically literate professional is, in contrast to the non-literate, able to find ways to explore and navigate the unfolding interrelations of practice and technology to best serve situated activities and the wider objectives of practice. What becomes of interest is how in this case nurses, can situate their navigation of pathways within the historical context of previous procedures to become familiar with the unexposed terrain that new technologies make available? And what are the differences in the ways that novices and experienced practitioners develop their maps and paths for travelling through this uncharted territory?

Nursing practitioners’ opinions about their use of technology can be taken from certain historic standpoints. Duties that relate to digital technologies such as the electronic patient journal (EPJ) for example are explained by shedding light on earlier manual procedures as being inferior, time consuming and difficult to use: “*Before we had an almost A4 sized sheet of paper with notes where you could write all sorts of things, and you weren’t able to document half of what was written down. Anyway you had to use time and energy to find out where to set a cross. You couldn’t document everything. Now we have the electronic patient journal*”. This negative view of the previous procedure is on the one hand related to a difficulty of wayfinding (Ingold 2000) in comparison with the use of the preferred newer digitally mediated way of working but also of her wider experience of it. Her view of positive progress is informed by the process of adaptation from the old to the new. In this case it was through a close involvement in which “*Now we have the electronic patient journal that two of us were able to totally reconfigure*”. This isn’t simply a view of becoming familiar with an imposed technology but of the consideration and modification of it together with the concerns of practice. The impression of flexibility using the new technology together with the nurses’ experience resulting in a preference expressed for the EPJ.

The time taken to complete procedures appears as a common lens through which to compare newer and prior practices. A recently qualified nurse considers her experience of a previous manual procedure “*we had a kind of big sheet of paper where we should write new prescriptions and times and it is much more time consuming*”. This isn't however a comparison made between her own experiences of having changed from one familiar way of doing things to another but of having to adopt an unfamiliar alternative during the breakdown of the digital technology. Slowness of the paper procedure becomes a negative factor although interestingly the unreliability of the digital technology creating the need for a backup isn't her concern. The older alternative method of record taking exists here not as daily skilled practice but as a difficult and unfamiliar one “*it’s a bother, a real bother*”.

In contrast a more experienced nurse takes a contrary view of the same situation “*Before we had a piece of paper and then you crossed three boxes. Today you have to go through almost ten different screens [computer interfaces]*”. In her comparison it was easier having to check boxes on a paper document than the need to navigate within the computer interfaces. Her account was

between a previous daily practice and the imposed digital alternative. Professional judgement here isn't a simple contrast between then and now but interwoven with the contingencies of everyday practice such as variations in the time taken for the computer to respond ***“if it's a day where it runs slowly”***.

The contingencies of procedures provoke judgmental comparisons between different technologies reflecting broader attitudes towards technology. Alternative approaches almost inevitably seen in the light of the perceived advancement of technology (Edgerton 2006) alluding to the yearning we are taught to have for new technologies. Framing through the notion of progress influence the comparisons made between technologies and their consequences for the practitioner. Blood pressure measurements by digital means supersede the rubber tubing, sleeve and hand pump of the medical manometer effectively transforming it into an historical artefact. But what effect does a technology replacing such skilled actions have upon the ways these are compared? Does for example the use of a digital oxygen meter make redundant the skill to recognise clinical indications for oxygen deprivation such as observing blue lips? Trying to answer this raises issues of the reliability of technologies to sustainably mediate procedures effectively whilst excluding previous practices. Given the high stakes of certain types of technological malfunction within nursing, practitioners become aware of a wider clinical horizon ***“there are times where clinically I think “you can't always rely on technical equipment””***.

Digital meters for blood pressure measurement although relying upon newer technologies haven't as yet replaced the alternative traditional medical manometer. This allows new practices to emerge in which the two alternative procedures can be combined to overcome situations of uncertainty ***“if it looks strange or doesn't compare with how the patient looks then I may well take a reading manually instead of electronically”***. These interrelated uses of comparative technologies imply that clinical objectives provide the ultimate value judgements of skilled practice and not the rational of any particular technology. Referring to a digital temperature meter an experienced nurse explains ***“we take the reading in the ear but you can't always trust it. If for example the patient has just come in from the cold then the reading shows a far too low temperature. In that case I don't trust technology”***. This distrust reflects again the governing role of clinical judgement upon the choice of alternative procedures and points to the uneasy dichotomy between the skilled practitioner and technological functionality. Disclaiming the authority of digital readings restores the nurse to a previous state before 'imposition' in which it was herself and not technology that was the decisive factor ***“it's like when you use yourself again”***.

The complexities of the digital display of even the simplest vital signs monitor reflect precision and high tech authority when compared to handwritten markings on a paper clipboard. Asked what possibilities are available in case of a breakdown or where no monitors are available then an experienced nurse gives a matter-of-fact reply ***“then you just do it manually and write it down every hour”***. As technology isn't the goal of nursing practice then if it fails to serve, it becomes dispensable. Seeing beyond the complexities of the technology's interface or rational of operation is primary to judgments of which means are best adopted in the interests of patient case. For Barnard & Gerber this is the *highest level* through which technology is understood where there is a conflict between clinical responsibility and ***“the external forces that arise from technology”*** (1999: 164).

Are all practitioners able to equally see such 'external forces' and the wider consequences of adopting alternative procedures and technologies? What extent does this depend upon clinical experience or factors such as age ***“it isn't a question of whether they are old or new! But a question of experience or no experience”***. What do we mean by experience in this case and what

does it allow? One claim is that an experienced practitioner can *“easier imagine what to do without a computer”* supporting the notion of some wider horizon.

Asked whether she had been in the situation of not having a *'bladder scanner'* and what she might do if it broke down a nurse replied *“no”* adding *“you can tell when the tummy is a little tight and so estimate how much water has passed during the last 24 hours”*. Although the need for this alternative procedure hadn't been encountered in practice her clinical experience provided signposts for how to tackle this eventuality. It could be said that her experience of care beyond the rational of the technology that permitted the option of perceiving a patient's condition directly rather than by way of the scanner.

Such judgements are complex and build upon knowing in practice (Nicolini et al. 2003). A knowing that isn't changeless but rather *“an ongoing social accomplishment, constituted and reconstituted as actors engage the world of practice”* (Orlikowski 2002: 249). Because of this constant renewal individual practitioners exhibit alternatives in their approach to tasks and importantly they become aware of these differences amongst their co-workers *“Some of the older nurses don't use quite so much time to read the patients and the like. It is because if they see 'such and such' then it means 'this and that'”*. Adopting alternative procedures doesn't seem simply as a case of mimicking or disseminating the behaviour of others *“You can't just copy others. To be honest you can't just read about things. You have to try it with your own body”*. This need for the practitioner to gain what might be called a deeper understanding relates to the multifarious nature of skilled work. For Schön as his *reflexive practitioner* increasingly learnt through experience then *“his knowing-in-practice tends to become increasingly tacit, spontaneous, and automatic”* (Schon 1983:60).

Technological literacy enables a movement from imposed to preferred technologies involving both tacit knowledge and explicit knowledge (*knowing-how and knowing-that* (Ryle, 1984)). This form of learning allows the navigation of pathways to best serve the goals of practice. Through their narratives practitioners build upon their explicit understanding to justify their acceptance of technologies as preferred or not. In the case of the EPJ for example *“it's really smart to be able to see what has been done on another ward. That you don't need to send for a journal to be collected.....it is smart that it's all in one place”*. These reflections don't attempt to capture allusive aesthetic undercurrents of our day to day that might tell tales of our automatic actions. How could it! Instead we understand the introduction of technology into working life through a kind of historical rationalism able to compare the advantages of the new over those of the old in the same manner that a salesman of a new technology might direct his sales pitch.

Going beyond the characteristic rational of the salesman is the awareness of the situated nature of technology in-practice involving unexpected contingencies that arise during day to day engagements with unfolding actions. It is here there remains the challenge for technological literacy to foster a critical dimension reflexive to the changing situation. So whereas response to the implementation of digital recording using the EPJ is positively perceived of as *“I think it's actually an advantage that everything is together in the one place”* unforeseen consequences emerge through the embodied nature of practice within for example organisational structures and the securing of resources *“It can be a problem when for example there aren't enough computers. During rounds there can be so many sitting in the office. There are six computers to the double number of people. And there we have a problem!”* .

To provide useful means for achieving the goals of practice, imposed technologies demand a reconfiguration of their *“in-practice”* relations. Reconfiguration affecting in some cases long established ways of working. Deliberation and scepticism by skilled workers over the need to engage in new ways are linked to both professional judgements and identities. Exploring new pathways can mean having to overcome new doubts and uncertainties. Modernised hospital wards led in one case to a reluctance by nurses to adopt them preferring the older equipment over the new ***“Oh there were things that look so different”***. The established forms of practice were seen as providing more certain and familiar procedures ***“so of course we will rather have our patients placed in the old wards”***. The shortage of beds in turn forced a reconfiguration of practice - to begin to adopt the new wards. Directly engaging with the alternative ways of working introduced the bodily aspect into changing practice and successively attitudes changed ***“But after the patients used them the nurses had to relate to the new wards. They became confident with them and it became a habit...And now that’s where we want the patients”***. Acceptance of the imposed technology as one more suitable for practice reflects back to the previous alternative after which ***“they just didn’t want to use them at all”***. Consequently there is a double movement in which going from the imposed to the preferred results in the depreciation or aging of the original practice from preferred to previous.

Reconfigurations are temporally situated influenced by organisational structures such as processes of implementation. Technological developments also occur over time and impose incremental changes into the world of work ***“it started when you could book the porters and different things through the computer. Then I got use to it little by little but I still though it was a difficult time”***. Correspondingly becoming familiar with technology isn't a continual change but an incremental one placing demands upon practitioners to establish ways of learning. Such learning cycles become entwined within practices themselves through strategies and conceptualisations of how they need to be tackled ***“registering my work times in a new system that I haven’t got to know properly makes me think: I just need to learn how to get use to it and it will be alright”***. In this way getting use to technology becomes a decisive influence in the movement from the imposed to the preferred. Similar factors enabling this reconfiguration appear the acceptance for example that time, effort and incentive play distinctive roles ***“it does take time though, but it pays off in the end”***.

Navigating the changing implications of in-practice technologies isn't merely a case of perseverance and adequate learning leading to guaranteed acceptance and preference. Technologies have varying affordances (Gibson 1979) providing opportunities for practitioners to reconfigure their actions in the interests of their goals. If useful opportunities aren't found then the technologies become inappropriate. In other words they remain imposed and unable to serve the objectives of practice. An attempt to administer medicine using handheld PDA computers linked to the electronic medicine journal becomes an illustrative example ***“we were part of the pilot project that started 6 years ago and we still have problems because it only works now and then. And I will say there has been pressure from management that we should use it. It’s a difficult problem because it was mended the day before yesterday and it doesn’t work again today. So you can say that you can’t get nurses to use these PDA’s if they only work every third time.....we want to use them but if they don’t work then we choose not to”***. The imposed technology remains underdeveloped unable to afford reliability to the nursing staff despite their efforts. Not able to move from imposed to preferred pathways the choices open to practitioners remain complex. Established and forthcoming procedures remain intertwined in an uncertain fashion prohibiting successful navigation.

Conflicts arise between workers having varying responsibilities and viewpoints so that ideas of which means to pursue become linked with wider organisational aspects such as hierarchical

structures, economy and political strategy. Interplay arises influenced by the contrasting goals of different stakeholders and the attempts of practitioners to establish preferred procedures **"We have used really a lot of time and effort to get people to use them [PDA's] because they really improve patient safety. And when they don't work there goes a few weeks and people stop using them and we need to start from the beginning"**. Although having the same end goal of providing benefits to patients this manager's view compounds the technologies unreliability with an attentive awareness of the resources that have been employed to impose it.

The mutually constituted nature of technology and practice gives rise to a paradox within the world of work. The more one aims to fashion either one, then the more the other is influenced. The only way we have to navigate the dynamic interplay between the two is through the world of our experience. A world that is continually coming into being. Through a contrast of two point perspectives, the new and old, then our experience becomes momentarily suspended between them from where we might construct some sort of map to plot a new course of action. As both the current and previous perspective become more familiar to us then the more detail we can draw upon from where to take bearings and so the easier to find our way about. In this sense practitioners become travellers relying upon a developing form of professional understanding. Future configurations of technology and practice cannot be fully known. Ways of acting with technology are not determined in advance due to strictly designed artefacts and procedures but must be continually worked out anew. The imposition of new technologies demands ways of exploring this to become familiar with technology's in-practice details. A central aspect of technological literacy, this ability to explore becomes a determinant factor in our reconfiguration of technology and practice and the mechanism through which we are able to arrive at preferred ways of doing things.

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Symposium Paper Three

EMOTIONAL ENGAGEMENT AND DETACHMENT IN HUMAN/TECHNOLOGY RELATIONS WITHIN NURSING EDUCATION

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The nursing profession is experiencing an increased use of various high- and low technology tools both in the clinical practice setting as well as in the training and education of nurses. In nursing education there is an increased use of simulation-based training and the training of clinical skills in a skills lab setting serving to bridge the perceived gap between theory and practice within the programs, as well as a result of an increased focus on patient safety, various cost cutting measures, a shortening the course of treatment, and an overall greater pressure on the healthcare system with a growing patient population above the age of 65 and a growing population of patients suffering from chronic illness². The implementation of simulation and laboratory based skills training as a new teaching strategy among nursing students in Denmark compels me to investigate whether this way of training nursing students merely provides a space for developing clear and unequivocal hands-on clinical skills, or whether it changes the social relations and professional practice in healthcare education in new and unpredictable ways? This also begs to question what kind of health professionals emerge or are expected to emerge from these recent changes in nursing training? I argue, that the presumption that technologies possess certain cold, rational and logic qualities while humans possess other affective and empathetic ones should be challenged, and replaced with a concern with forging new links between technology and affect. More specifically, this paper explores the ways in which affect is a central part of the nursing practice that is played out under the socio-material conditions of the skills lab.

Through six months of fieldwork following a group recently enrolled nursing students both in the classroom, in their clinical placement and in the skills lab training, I initially looked at the *effects* of skills lab use, but as time passed I found myself increasingly captivated by the *affects* within this space. With this fascination, I set out to *follow the feeling*, so to speak, allowing myself to look at the emotional aspect of other nursing contexts. By adopting the methodology of his I am permitted to challenge the dichotomist separation between technology and sociality through an empirical exploration of technologies situated in practice. By following the feeling the thing that become visible within my field are not only people, things and what is said and done, but also the embodied and affective nature of becoming part of a professional practice that this brings about. The approach of following the feeling aims to capture and embrace the affective while still accentuating the materiality of practice, where the focus is on life's "expression in shared experiences, everyday routines, fleeting encounters, precognitive triggers, practical skills, affective intensities, enduring urges, unexceptional interactions and sensuous dispositions" (Lorimer 2005: 84). Ethnography was chosen to facilitate a prolonged and immersive exploration of nursing students' technological engagements. During the six months of fieldwork I gathered details of nursing students everyday practices across different learning and professional spaces (classroom, clinical placements in hospitals and skills lab). The methods used during the six months of fieldwork included observations, participant observations, semi structured interviews and focus group interviews with both students and teachers at the nursing school. Daily fieldnotes were kept in order to capture and remember the textures of affective, technological and professional experiences of the field.

² Folkesundhedsrapporten Danmark 2007

Through my work of following the feelings within nursing education, I am able to ask central question concerning social relation between people as well as between people and technologies. What counts as a social relation, who can participate in it and how can it be described? This methodological approach will produce an account of the nursing profession as a dynamic practice that is both social and technical profession, where the recent introduction of technologies, such as simulation based training, cultivates new social relations and roles that must be examined. With *affect* as my empirical focal point, I want to expand the notions and perception of technology use in the field of healthcare.

Skills Lab Design Principles

Skills labs, carved out as a separate space within the nursing education, is the subject of this ethnography about affect, technology and professional practice. Skills labs are typically organized to resemble a hospital ward with a variety of different artefacts and technologies, such as hospital beds, hospital tables, medicine and equipment, as well as more or less computer controlled dummies that are used to build up nursing professional clinical skills within areas such as personal hygiene, mobilization, giving food and liquids and taking and observing vital signs. Students are both expected to become familiar with basic clinical skills, as well as with touching and being touched by other people, identifying and setting personal and intimate boundaries and handling unpleasant or delicate matters through the use of theatre and roleplay. Early in the program nursing students are taught how to execute concrete clinical tasks, but towards the end of the program students are trained in full scale simulated clinical scenarios, such as cardiac arrest.

Theoretical Foundation

Through the use of Annemarie Mol's notions of multiplicity my empirical data will tell the story of the way in which the skills lab, although placed at the nursing school separate from the everyday life of a hospital, nonetheless generate connections between these different spaces of professional practice. While connections are *made* between the staged space of the skills lab and the everyday life at the hospital, others are, in turn, *cut* to constitute this as a space of practice in its own right. Thus, connections are continuously made and cut thereby locating and dislocating, constituting and transcending the skills lab's relation to the professional practice of nursing. Both the making and the cutting of connections between multiple spaces of professional nursing practice take on many shapes. Connections are made when the nursing students are required to always wear scrubs in the skills lab, an organizational dress that provides the students with a sense of professional identity (Pratt & Rafaeli 1997), and when the students learn to manoeuvre and operate different professional tools, such as the blood pressure measurer. Connections are in turn cut when, instead of a real patient in flesh and blood, students are practicing their clinical skills on a technological dummy made out of plastic, and instead of the catheter filling up with urine, it fills up with water or apple juice. However, this making and cutting of connections are also affective in character, while certain affect are deliberately called-upon to practice in preparation for a professional everyday life in a hospital, others emerge unexpectedly only within the distinct space of the skills lab, such giggling or strong emotional outbursts. I consider how the making and cutting of connection are also affective in character, and how these affective makings and cuts connects and disconnects the boundaries between the skills lab and the professional practice of nursing. Indeed, "We live in a world of compartments and borders which may be more fluid and elastic, easier to cross than in the past, but they are out there all the same, impacting upon the minutiae of our daily life practices,

identities and affiliations” (Newman 2006:183). It is with a focus on this nexus of affect, technology and professional practice that this paper and presentation places itself.

Mol’s (2002) book *The Body Multiple* is an ethnographic investigation of the treatment of atherosclerosis in a Dutch hospital, and the way in which this illness is enacted across many different settings:

“If we no longer presume “disease” to be a universal object hidden under the body’s skin, but make the praxiographic shift to studying bodies and disease while they are being enacted in daily hospital practices, multiplication follows. In practice a disease, atherosclerosis, is no longer *one*. Followed while being enacted atherosclerosis multiplies” (Ibid.: 83).

Mol’s notion of multiplicity allows the reader to challenge the clear separation between patients and illnesses, while making shifting relations between bodies, knowledge, tests, technologies and treatments that continuously produce versions of patients and illnesses visible. According to Mol, an illness such as atherosclerosis should never be taken as *one* notion, but rather as a range of possibilities that can be actualized or mediated in different ways when entering into a relation between technologies and people. By making use of Mol’s notion of multiplicity, I will, similarly to Mol’s own line of reasoning, argue that the skills lab is a space where versions of a professional practice can be played out through different bodies, scientific notions, technological potential and professional experience, but that these different versions of a professional practice “[...] hang together even so” (Ibid.: 116). Mol provides an occasion for understanding the professional practice of nursing to be viewed as multifaceted phenomenon – “[...] more than one but less than many” (Ibid.: 55). Through Mol’s theoretical notions it becomes possible to challenge the idea of entering into a professional practice as clear and unambiguous process, wherein the students following one semester after the other are able to fit within the description or label of a *nurse*. Furthermore, Mol makes it possible for us to understand how a professional practice can be enacted in a variety of different contexts or spaces, by making several professional realities visible, thereby permitting a multidimensional story about becoming a nurse. From this worldview, a professional space, such as the skills lab, becomes dynamic and emergent, rather than merely inertly bounded unit.

I want to add an affective feature or facet to Mol’s ideas about multiplicity, emphasizing the importance of paying attention to both that, which can be clearly seen to exist and that which you can touch and feel. While there is no fixed definition of affect (Thrift 2008), Thrift suggests that affect “[...] is not simply emotion, nor is it reducible to the affections or perceptions of an individual subject” (Ibid.: 116). Rather, Thrift takes a Deleuzian approach, where “[...] affects are not feelings, they are becomings” (Deleuze 1995: 137 cited in Thrift 2008: 175). Affects go beyond “[...] the inner world or interiority of the human subject” (Navaro-Yashin 2009: 12). Rather than residing within individuals alone, affects are social, relational and performative. When seeing affectivity in a sociomaterial perspective it expands further than the individual human and embraces affects that are “[...] discharged through objects and space. [...] making it possible to read many other things, such as space and the environment, as affective” (Ibid.: 12). It is within this realm of the encounter of affect, technology and professional practice that this research falls, highlighting that professional practice is multiple, as well as how spaces of learning are affectively charged. Adding the notion of affect to Mol’s ideas about multiplicity will shed light on the way in which

affects constitute and transcend the space of the skills lab, enabling me to study as how technologies *do* things, that is, they engender or generate affectivities, as well as how interactions between the users of the skills lab and the technologies within it are forged. For the users of the skills lab, these technologies both make and cut affective connections between the skills lab and the hospital setting.

A Case of Caring for Plastic – Skills Lab as an Affectively Charged Space of Learning

The data below is an excerpt from my fieldnotes from a day of participant observation in the skills lab, where the nursing students were trained in female catheterization on a simulation dummy.

“The instructor had unwrapped the catheter, and as I had seen so many times before, she was demonstrating the insertion of a female catheter before allowing the students to do it themselves. During her demonstration a discussion of everyday life at a hospital emerged, when a student asked whether there was a preferred time of day for catheter insertion in order to decrease the risk of infection. While the instructor was describing the daily routines on a hospital floor, her right hand was resting on the thigh of the dummy, and as she was referring to a patient her eyes fell on the dummy’s naked and exposed lower body. She realized that the dummy, Mrs. Hansen as she was referred to by both students and teachers, was lying exposed on the bed with her legs spread apart. She quickly grabbed the duvet on the bed next to her and covered her lower body, after which she gently stroked the hand of the dummy and said: “I’m terribly sorry, Mrs. Hansen, for leaving you lying exposed like that.” After the duvet was removed once again for the demonstration to continue, the instructor started explaining how a real female lower body wasn’t comparable to the plastic ones they had in front of them: “First of all, there is no pubic hair on the dummies, and that makes a huge difference for the whole experience whether there is hair or not, because it’s simple difficult to see what you are doing. A lot of times it can be challenging to make out what goes where, and you can easily end up inserting the catheter in the wrong ‘hole’. But as soon as you reach the bladder, urine will start filling up the catheter. Look!” She directs the students’ attention to the tube on the catheter. “Now urine is running through the tube, or in this case, it is not urine, but water””

From the above it becomes clear the skills lab is not a formal clinical space, despite it’s recognizable clinical interior. Neither are the dummies far from being real human beings made of flesh and blood, nor the liquid filling the catheter real urine. What stands out in the excerpt, is the unpredictable nature of Mrs. Hansen’s lower body. The instructor’s behaviour towards Mrs. Hansen indicated that what is being trained here is more than gaining hands-on experience or with various instruments and tools., or learning isolated skills, but also and everyday professional practice. Within the field of nursing, everyday practice, is not something that can be trained to perfection through rigid repetition in a laboratory, but it can occur unpredictably and elusively, as when the instructor becomes aware of Mrs. Hansens’ exposed body, and she has to find an appropriate way to react. Mol describes the multiplicity of everyday practice in this way:

“If practices are foregrounded there is no longer a single passive object in the middle, waiting to be seen from the point of view of seemingly endless series of perspectives. Instead, objects come into being- and disappear – with the practices in which they are manipulated. And since the object of manipulation tends to differ from one practice to another, reality multiplies. The body, the patient, the disease, the doctor, the technician, the technology: all of these are more than one. More than singular. This begs the question of how they are related. For even if objects differ

from one practice to another, there are relations between these practices. Thus, far from necessarily falling into fragments, multiple objects tend to hang together somehow. Attending to the multiplicity of reality opens up the possibility of studying this remarkable achievement” (Mol 2002: 5).

This *remarkable achievement* demands a continuous effort to be created and maintained. Hands-on experiences with different professional tool are no doubt trained within the space of the skills lab – manoeuvring and operating different nursing instruments, but these hands-on skills do not exist outside a professional context made up of people, affects and naked female lower bodies, such as Mrs. Hansen’s – that is, placing these skills within a professional practice. The way in which the instructor is considerate of the feelings of a plastic dummy, her many years of experience of fine tuning these considerations, reach beyond an isolated hands-on clinical skill related to a female urine catheter, and makes connections to a situated professional practice. The interactions between the plastic dummy and the instructor provides the students with access to the unpredictability of everyday professional practice, despite the fact that they are located in a laboratory. With the help of Mol’s notion of reality we understand how this access is granted, when she argues that, “We do not master realities enacted out there, but we are involved in them”. The students do not gain access to an a priori professional practice, rather, it is a professional practice that emerges in multiple spaces. The professional practice is neither stable across these different spaces, nor are they so diverging that we cannot detect connections between them.

Cutting Connections Between Professional Spaces

I will continue my exploration of the making and cutting of connections between professional spaces of practice with yet another piece of empirical data. Allow me first to set the scene for the data to come. As part of the opening and establishment of the skills lab at the nursing school in which I did my fieldwork, the instructors and skills lab coordinators had invited a theatre group to come and do small role playing exercises and perform a mini play in the skills lab for and with a group of students. I conducted participant observations throughout the day, and took part in a number of exercises aimed at making the students reflect on affect and intimacy. I was blindfolded and asked to trust another person to lead me around a room filled with other blindfolded people, in an increasingly faster pace. I was then challenged to ask someone to “take their feet off the table” in three different ways: Respectfully, demeaning and aggressively, after which the roles would shift, and I would be the one to be asked the same question in the same three ways. This exercise was followed by a small focus group discussion about how asking and being asked in those three different ways made us feel. The day ended with two actors acting out a small play about a nursing student on her first day of a clinical placement in a hospital.

The play was introduced by Helle, who is a central person for the day-to-day continuation of the skills lab. She stepped in front of the students and opened with her usual introduction of the skills lab. One that I had already heard many times before: “Above all, the skills lab is a space where you, as students, should all feel safe to say and do whatever you want”. She continued explained that they were going to see a play about a student on her first day of clinical. Halfway into the play the actors would do a time-out, to make room for a discussion about the play with the intention that the students would make suggestion on how the play should end. “We will stop time, so to speak, and make it possible for you to help us decide what should happen next in the situation that is acted out. You can say anything you like, there are no right or wrong answers when it comes to how you feel about this, and I ask of you that everything that is shared in this room stays here. Please refrain from

sharing this experience with other fellow students that you might talk to. It is very important that you feel safe to say and do anything you like in here.”

A young woman (nursing student) enters the stage made for the occasion in the skills lab. On the stage is a hospital bed with a patient in it, and a middle-aged man dressed in a nursing uniform (experienced nurse preceptor). The experienced nurse preceptor is talking to the patient in a friendly tone about how she slept and what she would like for breakfast. Meanwhile, the young nursing student is standing in the background clearly eager to participate in the activities around the bed, but not invited by the nurse preceptor to step in. As the student attempts to take part in the conversation between the nurse preceptor and the patient she receives no response. After a while the nursing student turns to the audience and speaks her train of thoughts aloud: “I feel so uncomfortable right now. I just don’t know what to do with myself, and it seems like no matter what I do here, I’m just in the way. Maybe this means that nursing is not what I’m meant to do, because nothing about this feels right or familiar to me” She takes small nervous steps back and forth, while she tries to find something to do with her hands – in her pockets, behind her back, touching her face, and after another moment or two a time-out is called. Clearly the situation portrayed in the play resonated with many of the students. Some students remembering back on their own first clinical placement, and some anxiously awaiting theirs still to come. A discussion arose among the students about whether it was the student’s own responsibility to be better at actively joining in the activities of the hospital or whether the experienced nurse preceptor was to blame for not taking enough interest in including the student. Students shared some of their own similar experiences and drew on some of their own solutions to the dilemma at hand. The group of students agreed that the play should end with the student as well as the nurse preceptor mutually initiating the inclusion of the students into the activities, and after a range of different suggestions were given by the students on how to do that, the theatre group acted out the scenario.

The above expert tells a story about a space where the dimensions of time are manipulated in order to allow affective reflection on a professional practice. Helle’s introduction should be understood in terms of a moral cutting of the connections between the skills lab and a clinical hospital setting. The students are made aware that, contrary the name of this space, ‘skills lab’, they are *not* there to learn about ‘right and wrong’, that they will not be evaluated on their ability to carry out specific skills. On the contrary, they are there to reflect on a professional practice, center-staging affective aspect and dilemmas of this practice, and even effectively stopping time to allow for this reflection to take place.

Conclusion

The intersection of affect, technology and professional practice is meaningful because my data makes it clear that it is relational – they are linked within and constitute the space of the skills lab, and in turn, the skills lab highlight the connection or the link between affect, technology and professional practice. The making and cutting of connection within the skills lab strengthen some connections while weakening others, and the stabilization that this brings about also destabilizes other possible stabilizations. My point is, that the affective aspects of the skills lab must be accounted for, because only then will we understand the complexity of this space. Perhaps, contrary to common belief, acting out staged scenarios with plastic dummies instead of human bodies, allows for reflection on handling and sorting professional affect. In this perspective, affect only

really makes sense once we look at it as a heterogeneous and sociomaterial process, and not something residing within the individual.

In that sense, describing this space as merely a skills lab, does not cover the range of activities that goes on here. It implies a space wherein students as user are in opposition to, as well as acting on, technologies (Dolwick 2009: 35) in order to learn isolated and identifiable professional skills. Instead, I argue, the skills lab is a space in which students act “with, through, or in respons” to technologies (Ibid. 35). I have argued, that the category of practice rather than skills provides a deeper understanding of the complex activities conducted in this space. Professional practice in the skills lab is constituted through the forging of connections

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