Technological literacy in the welfare state – a new path for education?

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Technologies have always been an integral part of professional practices in the public sector in Denmark. Nonetheless two recent trends, one political and one educational, tacitly implies that assistive technologies and digital solutions are novelties being introduced into the work of professionals in the public sector to enhance the quality and efficiency of the welfare state. These parallel movements have a dual impact on the education of future professionals – one is aimed at setting the agenda for the professional practice that students will enter after graduation, and the other is aimed at defining the role of the educational system in preparing the students for this professional practice. Both revolve around the recontextualization of professionals and the technology that is part of their practice as specific types, i.e. that of welfare professionals and welfare technologies. (Greve, 2011; Majgaard, Petersen & Kallesøe, 2012)

This article takes technological artifacts to be "a form of distributed social expertise: that is, knowledge-in-practice situated in the historical, socio-material, and cultural context in which it occurs." (Gherardi & Nicolini, 2000, p.329) Technologies involved in professional practices are are treated as 'plug n' play' technologies with well-defined functionalities and predictable effects that can be what Bruce refers to this as the 'technology independence assumption' (Bruce, 1996). As such the present focus on welfare professions and welfare technology poses the threat of propagating technological determinism and reducing the understanding of technological literacy to mechanical use. We propose a different approach grounded in an understanding of the socio-material entanglement of people and artifacts in a given profession.

This paper addresses one overarching research questions and two sub-questions:

1)   How can we understand the recontextualization of professions and technology into welfareprofessions and welfaretechnology?
a.   In which sense are welfare professional faced with socio-political demands in this emphasis to employ (new) technology, e.g. what are the societal demands and expectations to the welfareprofessional?
b.   How does this 'push' of technology impact on practice in terms of the consequences they bring about in the everyday, situated practice; e.g. how is the new technology incorporated into the existing practice?

We conclude by discussing the impact this has on the question of how to approach technological literacy.

The paper draws on empirical material from an ongoing EU-funded research project which is conducted in collaboration with researchers from Roskilde University and researchers and teachers from University College Zealand.

Introduction

Welfare technology is a rather new term, but has in a very short time had an enormous impact on the general political discourse in Denmark (Majgaard, Petersen & Kallesøe, 2012, Eskelinen & Frederiksen, 2011). In a newly published Public strategy for Digital Welfare, digital welfare yields is described as an important way of ensuring a more convenient life for citizens for less money, as well as ensuring a productive and innovative public sector (Regeringen, KL & Danske Regioner, 2013). Welfare technology is regarded as the 'savior' of the welfare state, as implementation of digital and technological solutions carry a promise of a more efficient and productive public sector that can deliver the same (or higher) quality for less money. The agenda calling for greater use of welfare technology is driven by a number of factors: namely the future demographic constitution with more elderly people, the risk of fewer employees in the public sector, as well as a potential of more people centered services (Greve, 2011). In order to better understand why welfare technology has become so important and what the term means for the professionals that are expected to use it, it is necessary to give a brief view of the context in which it is used.

Setting the scene – the welfare discourse in Denmark

The Danish society is readily characterized as a welfare society, or a welfare state (Raffnsøe, 2008; Jensen, 2011; Pedersen, 2011). Although scholars and politicians disagree about the origins of the welfare state (some date it to 1890'ies and others to 1950'ies) and whether or not the welfare state is deteriorating and taking up new societal forms (Jensen, 2011; Pedersen, 2011), there seems to be consensus about the importance and omnipresence of the concept of welfare (Raffnsøe, 2008).

In Nordic contexts 'welfare professionals' is a label that is increasingly used to described semi-professionals, such as nurses, teachers, kindergarten teachers, social workers, and occupational therapists etc., as their primary tasks relate to the yields and services of the welfare state, e.g. care, nursing, education, and social cohesion. Historically the work of these professions is bound up with the growth of welfare institutions (Andersen, 2008; Hjort, 2004) and the state's effort to ensure the health, safety, social cohesion and development of its citizens, but only recently has this close

relationship surfaced as a recontextualization of professions. The technologies used in these professions as part of their everyday practice (Søndergaard & Hasse, 2012), are, by extension, dubbed 'welfare technologies.' This neologism covers a vast range of diverse definitions and examples of technologies from tele-medicine, assistive devices, iPads etc. (Heilesen, 2013).

The implementation of such technologies is thus intimately tied to the current political discourse on welfare. The term welfare technology does not as much designate a particular kind of technology as it designates the aim of obtaining a particular societal benefit by using the technology; e.g. iPads and computers are seen as learning devices to help develop children and youth in schools and kindergartens, computer operating systems guide the social worker in her engagement with clients and automatic vacuum cleaners ensure a certain level of service for the citizen and at the same time frees up resources to be spent elsewhere in the system. These and other assistive devices and digital solutions are continuously referred to as tools that enhance cost-efficiency and productivity as well as enhance the quality of life for citizens.(Regeringen, KL & Danske Regioner, 2013; Greve, 2011). Directly or indirectly, welfare technologies are considered to contribute to delivering the promise of the welfare state - namely the creation of a secure, coherent and democratic society (Pedersen, 2012, p. 15).

This short sketch points towards two concurrent movements. One is the political push of welfare technology as cost-efficient and time saving efficiency measures. The other is the recontextualization of certain professional practices, already tightly connected with the welfare state, as welfare professionals. These professionals are expected to become welfare professionals primarily by becoming technologically literate, i.e. learn to use the new welfare technologies. However the strong focus on technology eclipses the double-pronged pressure on their professional identity. While the experienced professional may recognize that technology has always been part of her profession, it is not at all certain that the connection between professions and the welfare state viz-a-viz the welfare technological agenda is apparent. Brodersen poignantly notes: "The logic of welfare work is tied to a state-logic, as welfare workers take on the task to propagate and maintain the perceptual categories, that will guarantee the realization of the welfare state" (Brodersen 2009, p. 38, our translation). This has led to a dual role, namely that of supporting and helping citizens within their specific area, as well as controlling them and motivating them to adhere to the societal ideals set up by the state (Järvinen & Mik-Meyer, 2012, p. 13).

A case in point

The paper draws on empirical material from an EU-funded research project[1] which is conducted in collaboration with researchers from Roskilde University and researchers and teachers from University College Zealand. Our data is generated[2] in two ordinary kindergartens located in the southern part of Zealand in Denmark. One kindergarten has 17 trained staff and assistants to cater for 116 children aged 1-5, and one kindergarten has five trained staff for 48 children aged 3-5. In each kindergarten we conducted a so-called Story Workshop (Hagedorn-Rasmussen & Mac, 2007) and several hours of observations including taking photos of examples of technology, as well as informal talks with staff and parents. In one kindergarten we also interviewed a manager and vice-manager. The outset for our data collection was to investigate what kind(s) of technology is used in and affects everyday work, and how technology is integrated and immersed in work – and thus explore what technology means in and to welfare professionals. The data has subsequently been analyzed using a thematic analytical approach (Braun & Clarke, 2006) where we have looked for emerging and recurring themes about the relationship between technology and welfare professional practice.

In both kindergartens we identified several technologies. For analytical purposes we divide these findings in what we label 'analogue' technologies such as white boards with information, photos, presence etc., pens, pencils, filing systems etc. Several technologies can be labelled 'digital' technologies and include iPads, computers, baby monitors, cd-players, a video projector, a 'sound-ear' to detect noise level, computer programs for documenting learning progress, activities etc., educational programs, touch screens for checking-in and out etc. The story workshops show that the informants experience an increasing integration of technology into their practice over the last 3-4 years. The informants from both kindergartens note how iPads and personal computers have become standard equipment in the rooms as well as the introduction of digital cameras, touch screens, electronic photo frames and other artefacts. But the informants also explain how computer systems for documenting practice, journaling programs, educational test programs etc. are introduced along with mail programs, intranets etc. that also have an impact on professional practice. In other words, informants show an understanding of technology as concrete artefacts as well as more 'invisible' technologies as computer programs and underlying systems that affect how work is carried out.

One case is presented; the use of touch screens for checking children and staff in and out. This case is interesting as it illustrates several things. Firstly the case illustrates

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[1] See more at http://ucsj.dk/viol/
[2] The data is generated by J. Sprogøe, R. Andersen and D. Schlüntz, Dept. of Research and Innovation, University College Zealand in spring 2013.

how digital and analogue technologies interact in practice. Secondly the case illustrates how the macro tendencies from the societal welfare technology discourse manifest themselves in the micro movements in the everyday life in the kindergartens. And thirdly the case illustrates how professionals circumvent and work around technologies in order to attach meaning to the use of technologies in everyday practice.

The kindergarten was established in 1998 as an experimental institution with focus on creativity, poetry and arts, inspired partly by the Reggio Emilia-approach; a pedagogical methodology originating from Italy (for a brief introduction see i.e. http://en.wikipedia.org/wiki/Reggio_Emilia_approach). The kindergarten was hitherto closely linked with the University College educating kindergarten teachers and other cultural institutions in the vicinity, but the cooperation has decreased over the years.

In 2013 the kindergarten introduced touch screens in the entrance hall for staff to check in and out when they arrive and when they leave, and for parents to check their children in and out. A private company addressed the kindergarten out of own initiative and set up the system for free. The kindergarten, however, had to invest in the screens out of own funds. The introduction of screens is tightly connected to the municipality's digital strategy, that posits a more comprehensive use of digital solutions to communicate with citizens and create more effective work processes (Guldborgsund Kommune, 2009, p. 7). The touch screen system enables staff and leader to access who is in the house from any computer in the kindergarten. The touch screen system also meant to serve as a safety device in case of fire, as rescuers relatively easily will know how many persons to rescue. The touch screen also gives information to the parents when checking out of things to bring, clothing to wear etc., and the screen is supposed to say what activities the children have engaged in during the day. In addition to the check-in screen, a large tv-monitor provides an overview over staff present the current day, as well as activities in the house. The touch screen system is meant to replace the white boards with magnets with pictures of the children, which hang in all the wards.

Observations and interviews with staff and parents about the check-in isystem reveal some interesting points. First of all, not all parents like the system. One father expresses the view that the system is unnecessary, and a mother of three says it is troublesome, because it takes longer time to check-in the children, as parents are often queuing up. The "old" magnet-system works better, says one father, because it provides a much better overview over who is present, and he forgets to notice the information on the little screen. Secondly, we observed that not everyone (also staff) remembers to check-in and out, and a parent notices that it jeopardizes the fire safety aspects of the system. This is confirmed by a staff member, who dryly notes, that the computer probably is the first thing to catch fire anyway. One parent notes that it might be an advantage for the controllers at the municipality, that they can keep statistics of

presence, staff level etc. The same is noticed by a staff member, who expresses her concern, that the check-in system is used as a basis for cutting down on staff - especially as the registration is incomplete. Manual check-in and out is still done, and staff still write post-it notes about sleeping times, holidays etc. One staff member explains how the magnet board gives a much better overview when sitting with the children, as they do not have to get up and start the computer and thus disrupt whatever process they are engaged in, in order to get information about presence, pick-up times etc. In one of the ward the staff member had not turned on the computer when we did our observations during the morning. Thirdly, the system is also not running smoothly and is often down due to technical problems, such as a slow wi-fi connection. In such cases, an IT-technician from the municipality is summoned, or the staff call upon the janitor, who has some IT-skills, which, in both cases, takes time. Activities and information is supposed to be on display in the entrance hall on the large tv-monitor, but most of the time the monitor is blank, as the system is not functioning properly. When we asked the leader how come the screen is blank, she replied that she is not entirely sure when the activities show, and that it might be because the system is in 'summertime mode'.

However, we also noticed and observed positive feedback. As daily activities and information is entered in the computer to be displayed on the tv-monitor in the entrance hall, the hallways do not appear so messy with old notes and colorful collages hanging, leaving, in the words of leader, the impression of a more systematic organization. Also the parents can log on the intranet from home and access information and photos. An unexpected positive side effect is mentioned by a staff member, who explains how they are communicating more with the parents now than before inducting the screens, due to the constant breakdowns.

Analysis and discussion

In our analysis we focus on two interrelated aspects. First; the examples of technologies described in the case are considered as technological artifacts that are immersed in practice (Orlikowsky 2007), and second, as we will argue in this paper, they are more than mere artifacts immersed in practice - they are immersed in a certain *welfare* practice (Dakers 2009) and thus reproduce different meanings to different "users" or actors.

Firstly the case illustrates how digital and analogue technologies interact in practice. The case shows that parents and staff readily accepts the introduction of touch screen technology in the kindergarten although they are not entirely convinced of the technology's effectiveness and usability. But the digital touch screens have not replaced the analogue magnet boards as a means of creating an overview over who is present

and who is not. The touch screens and magnet boards have overlapping functions and are at work in parallel. The case further shows how parents and staff circumvent and work around the technology by keeping a double registration, maintaining a paper based post it note system for messages and moving magnet back and forth when children are checked in and out. This demonstrates how technology is not just implemented as a "plug 'n play" solution as intended by designers and what is build in the systems, but technology is always situated (and thus amended to fit) in a local, historical context as a complex form of social and technical bricolage (Gherardi & Nicolini, 2000). Staff, parents and children are inclined to continue their established practices since they have already found a working solution (Simon, 1957). Using workarounds can be taken as expressions of doubt concerning the efficacy of the new solution, as maintaining a back-up system that compensate for perceived deficiencies, as unwillingness to invest the time and effort to implement the system and as attempts at modifying the given technology to continue the normal work routines, rather than take up the 'correct use' as defined by the engineers of the touchscreens (Alter, 2014). The parallel use also illustrates the 'interpretative flexibility of technology' (Orlikowski, 1992, Gherardi & Nicolini, 2000). The technology is seen as an alternative to existing solutions, but no uniform use or understanding of what the touch screens 'are' emerges. A finding that contradicts technological determinism that regards technology as having a specific use, function and effect that is somehow given by the artefact.

These insight calls for a more nuanced understanding of the relation between humans and technology. By way of practice theory, Orlikowsky describes this relation: "A practice lens assumes that people are purposive, knowledgeable, adaptive, and inventive agents who engage with technology in a multiplicity of ways to accomplish various and dynamic ends" (Orlikowsky 2000, p. 423). In relation to our case, staff and parents engage with the touch screens and magnet boards to accomplish different things; i.e. overview over presence, information of what clothes etc. to bring, communication with parents etc. However, it is important to underline, that also 'invisible' actors, such as managers, politicians etc., attempt to accomplish certain goals through the implementation of touch screens. The use (or not) of touch screens is thus also part of a political (macro) discourse, which we unfold and discuss below.

Secondly the case illustrates how the macro tendencies from the societal welfare technology discourse manifest themselves in the micro movements in the everyday life in the kindergartens.

The introduction of the touch screens in the kindergarten aligns with the municipality's strategy for digitizing work. It is not demanded by the parents or the staff. From a certain point of view the new technology thus advances a series of political goals. However the screens are implemented in the messy reality of everyday practice. There are existing

routines and technology to be considered. The heterogenous elements that embody and perform the particular work arrangements in the kindergartens - such as the magnet boards, the written post-its and safety procedures - constitute everyday work in the kindergartens and these are disrupted and renegotiated by the introduction of new technology. The new system is thus assessed, not only relative to whether or not it delivers what it promises, but also in contrast with how the existing work arrangements perform.

The screens are deemed to provide less overview by parents and staff alike. It is seen as cumbersome and combined with basic technological problems such as badly functioning wi-fi the screens seems to create a threshold and a self-fulfilling expectation of little yield for the effort of using it. The effect is less-than-rigorous use resulting in low reliability in terms of overview and therefore low safety in terms of accounting for the children's whereabouts. In the concrete situations where the screens are supposed to be used, the screens are approached as 'business as usual' and therefore assessed relative to whether or not they do the job as well as the magnet boards. The fact that some parents think of the process as less efficient reveals this 'one-to-one' comparison, which does not take the touchscreens other functions into account. As for the technology's overall effect on efficiency the entire assemblage of the technology in use offers no feedback indicating how to observe such an effect. This creates the problem that no one is able to pinpoint in which way the technology is supposed to be more efficient and hence the question of 'efficient for whom?' arises.

By way of the problems that are made visible, the case indicates perhaps a failure to meet expectations, but more importantly it showcases how a technology is modified and adapted according to the situated context in a process of translation. We interpret the case as an attempt by a particular political discourse to, what Gherardi and Nicolini calls 'exert control at a distance.' (Gherardi & Nicolini, 2000) The process of translation is a term that designates the passing of a command through networks of "translation agents which have their own reason for performing this action." (Ibid., p. 335). On the face of it, the technology is adopted and an attempt to advance the political goal of efficiency is made, insofar as the technology is absorbed into the work arrangement. However the production of the effect of more welfare for less money is ultimately at the mercy of the kindergarten. The screens do not produce overview, safety and efficiency in this case. Not due to any essential properties of the technology, but rather because the community only haphazardly attempts to translate the technology along the lines of an efficiency discourse. Following Gherardi and Nicolini we could say that "if one conceives the introduction of innovations, either material, behavioural, or conceptual, as deliberate attempts at control from a distance, it appears that the success of such translation efforts depends on the effectiveness of the tactics used by the intermediaries to discourage alternative interpretation." (ibid., p. 338) The introduction of technology that

carries the discourse of efficiency is muscled out by an alternative in the form of the status quo. The kindergarten that receives the screens is not discouraged from such an 'alternative' interpretation. There is no support in daily use from any intermediary (representative from the company, inspector or local politician) that would privilege an efficiency discourse. In other words the technology has no allies in the situation that forces the reconsideration of practices. Rather the technology is evaluated on the backdrop of how existing technology does the job. This is also evidenced in the fact that the few positive points that can be mustered are only mentioned in passing, such as the screens making the impression of a modern, up-to-date facility and the increased accessibility of information from home or a smartphone.

One could take this to suggest that once the technology is adequately implemented and properly received, then these problems would be solved and the artefact would do as promised. But this is not intended as a normative point. The possible scenarios (the adoption and rejection of the screen technology) are equivalent in the sense that we have no preference for either. The difference we are attempting to point out lies rather in whether or not the introduction of a new piece of technology is approached as the renegotiation of the professional space on new technological premises. Once we reject technological determinism, we cannot claim that a technology has a specific utility other than how it is brought to bear on a given assemblage. But the different uses a technology has are precisely not revealed before they are brought to bear on in a historically, situated activity. In the words of Kallinikos, Leornardi and Nardi:

"Rather than being simply constrained by structure, as the typical conventional interpretive understanding wants us to believe, human choice and agency are made originally possible through the very resources that objects and structures dispose." (Kallinikos, Leonardi & Nardi, 2012, p. 10)

Whatever goals the kindergartens may have, a technology is not 'adopted' until it has been determined how the social space is re-negotiated by embracing it. The assessment of the screens as substitutes for the magnet boards does not renegotiate the social space. It positions the touch screens in place of the magnet boards. The social space arranged in connection with the boards will almost inevitably be in conflict with the scripts installed with the screens. Had the touch screens been allowed to renegotiate the social space and reconfigure the work routines, some of the problems such as low reliability would go away. Again this is not an argument to adopt the screen technology. By reopening existing routines and ways of doing things an assemblage runs the risk of privileging "the demands of the technical subsystems over those of the social subsystem." (Leonardi, 2012, p. 40) For example by demanding work processes that make sense from a technical point of view, but less so from a pedagogical point. An example is provided by the need to go to a screen and access it rather than looking at

the magnet board across the room. The point is rather that to assess the novel possibilities that *might* be attractive, a technology needs to be assessed relative to how well-known social problems are renegotiated, not relative to how they perform as substitutes. An approach to technological literacy that recognizes this will be able to approach technology armed with questions of how to coax out the didactical possibilities of a technology supported contexts. Which brings us to our discussion.

Discussion and conclusion

The remainder of this paper addresses the question: What can be drawn from this case in terms of how to address technological literacy in the curricula of welfare professionals? This question is of interest to any profession involved in the ongoing recontextualization of welfare professionals and the way professionals are being educated and trained.

As already mentioned we take the stance that technologies have always been an integral part of professional practices. This accords with the claim that technology is social before it is technological (Deleuze, 1999; Bijker & Pinch, 1992). However, as is exemplified in the case, technology is being touted as a novelty in professional work settings as part of a high profile political push to promote efficiency measures. At the same time professional educations are in the process of incorporating technological literacy into their curricula. The educational aim is to prepare students for their future professions. This recontextualization of professionals and the technology to welfare professionals and welfare technologies tends to be based on a perspective that does not recognize that "technologies are not separate 'objects' in relation to the human 'subject.'" as Dakers puts it (Dakers, 2009, p. 128) In this sense we are in agreement with Bijker and Law in their social constructionist point, that most people tend to go by "[t]he commonsense assumption that people, entrepreneurs, or machines are naturally occurring categories." (Bijker & Law, 1992, p. 13)

The case shows that the political agenda (the effort to exert control at a distance) depends on pushing/promoting introduction of technology into the professional space in liaison with the acceptance of technology as cost-cutting. Locally there is always a messy reality that is prompted to adapt the technology. In the case presented the technology was not allowed/able to restructure the organisational setting. So although the political discourse may be 'successful' in introducing technology into an organisation, it is still contingent upon the local reproduction of the technological possibilities. Even when technology is successfully integrated and adapted there is no 'plug n'play' of technology. Rather the adoption of a technology entails a re-negotiation of how well-known social problems are articulated.

Our analysis indicates, that it is not enough to be technologically literate in a functional or instrumental sense. The technological literacy needed in practice requires the recognition that technology is situated, contextual and continually reproduced and negotiated (Gherardi & Nicolini 2000, Suchman, 2006). With this comes the insight that technology is not 'anything' until we have observed its consequences, that is, until we have re-negotiated how a particular professional situation unfolds on new technological premises as well as an awareness of the danger in not recognizing that such a renegotiation involves choices. Some options become more or less visible at the expense of others. Embedded in the technologies there are agendas at play which we knowingly or unknowingly support by choosing them.

"Technologies are not neutral, they have politics and consequently shape the way in which humans live in the world." (Dakers, 2009, p. 128)

On this background we see two recommendations to be taken into account, when preparing students for a future as welfare technological literate professionals:

1) First of all we propose that teachers recognize that technology is an integral part of the everyday practice, also in kindergartens. Technology takes different forms; analogue and digital, material and virtual; but commonly are all constitutively entangled in practice and thus affects the professional(s) practice. To quote Orlikowsky: "... *all* practices are always and everywhere socio-material, and that this sociomateriality is constitutive, shaping the contours and possibilities of everyday organizing" (Orlikowsky, 2007, p. 1444, italics in original).

2) Secondly we believe it to be important to raise awareness that there are choices and values at stake in how professionals renegotiate their practice in relation to technologies. A critical stance towards technology does not solely consist in a cautious attitude, but also in an astute eye for the transformative potential in technology.

"If knowledge is truly power, then the development of this critical capacity, this technological literacy, is surely more important than the development of and understanding of the functional aspects of technology." (Dakers, 2009, p. 131)

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