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Abstract

The aim of this paper is to draw attention to and discuss ethical and social challenges relating to the growing use of social robots and data generated by those robots in social work. We discuss a number of these challenges through the case of a robot baby used by various professionals in Denmark. We then take a broader view on social and ethical challenges based on comparative studies between Denmark and Spain on the use of social robotics in the social professions generated through the EU-PRoSPEro project. Lastly, we propose a case-based experiential learning approach for professionals to learn with and about the robot baby in a way that does justice to the practical, technical, ethical and social complexities of robot use in this field.

Keywords: Robots in social and healthcare • Didactics • Ethics • Robot morphology • Social and healthcare professionals

Introduction

To an increasing extent, conceptual and normative practices in our communities are being challenged by social robotics (Share & Pender, 2018). This raises questions regarding what authenticity and meaningfulness mean within social interactions involving social robotics, what a caretaker or companion is, and how the notion of 'care' relates to both caregivers and care receivers. Do social robotics mediate new or different interactions in user-patient-professional relations, and what do the nuances of such interactions mean for the identity of professionals working with or alongside social robots or professionals impacted by social robots?

Discussions regarding social robotics often provoke topics such as the materiality of the robot (primarily, how it looks and what it looks like) (Damiano & Dumouchel, 2018; Damiano et al., 2015; Fujita, 2001; Ishiguro, 2006); the contextuality of the robot (where it is meant to be implemented or where it is actively being used) (Fridin, 2014; Turkle, 2011) and what data the robot produces (Körtner, 2016; Schafer & Edwards, 2017; Sedenberg et al., 2016; Sharkey & Sharkey, 2012). In this paper, our aim is to expand these perspectives to present new or at least wider angles on all three

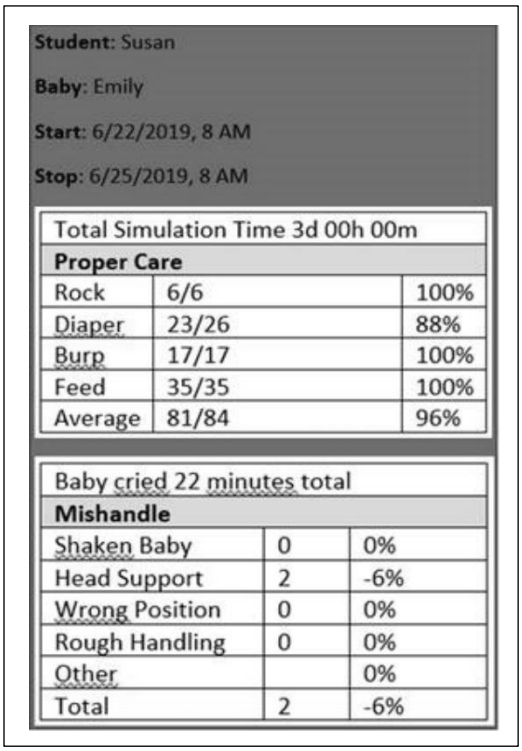
topics. We do this using the concrete example of the robotic baby that is used to exemplify issues that may be more universally relevant for the social professions and those who teach them.

We will do this by first offering examples of ethical and social challenges through the case of a robot baby being used by different professionals in Denmark. We then take a broader perspective on social and ethical challenges involving other research projects and the problems they present or inadvertently produce. Lastly, we will present the position of the Prospero project (see Share and Pender, this issue) as it relates to the education of social professionals.

The Robot Baby

The number of social robots within healthcare, education and the social sector has accelerated during the 21st century. This development generates new ethical and social questions on how to use, understand and interact with technology (Hasse, 2013; Scheutz, 2012; Share & Pender, 2018; Strandbech, 2015). Social robots are characterised by functioning in a social space, having a physical embodiment and operating through sensory processing of information, where actions are performed within a social space on the basis of such information (Reidsma et al., 2019). They can further be said to imitate, or at least facilitate, human engagement through their physical appearance, emotionality and/or speech (Coeckelbergh, 2009; Damiano & Dumouchel, 2018; Damiano et al., 2015; Fujita, 2001; Ishiguro, 2006). A further dimension of social robots is that they are capable of generating a wide variety of data in their monitoring of users and other entities. An example of such data collection can be found in the case of robot babies that are used in Denmark by nurses, teachers, social workers and counsellors in efforts to install normative parenting discourses among marginalised youths who have expressed the desire to become parents. Governing authorities question the ability of these youths to provide proper care for a child and find it necessary and appropriate to test or develop such skills in a controlled setting, thus underlining the baby robot's *raison d'être* (Søgaard, 2019). In light of this, the insertion of the baby robot becomes an example of governmental measures, where the appraisal, training and potential disqualification of the parenting skills of vulnerable citizens are partly delegated to a technological entity (the baby robot) and partly to the professionals' interaction with this entity and the data it produces. Consequently, the learning potential in the interaction with the baby robot becomes a construct between material, physical and normative praxis and established cultures.

Installed in the robot baby is technology that enables professionals to register and produce numerical statistics on several parameters. Fig. 1 displays a simulation report scheme that classifies the tasks measured, thereby providing a performance overview based on all the data collected by the baby robot. These data and resulting scores inform professional judgements of the participants' parenting skills.



Student: Susan

Baby: Emily

Start: 6/22/2019, 8 AM

Stop: 6/25/2019, 8 AM

Total Simulation Time 3d 00h 00m		
Proper Care		
Rock	6/6	100%
Diaper	23/26	88%
Burp	17/17	100%
Feed	35/35	100%
Average	81/84	96%

Baby cried 22 minutes total		
Mishandle		
Shaken Baby	0	0%
Head Support	2	-6%
Wrong Position	0	0%
Rough Handling	0	0%
Other		0%
Total	2	-6%

Fig. 1: An example of potential data-output from a robotic baby simulation report.

The data include: whether and how often in the period of interaction the participants took proper care of the different needs of the 'child' or mishandled it in some way; whether or not they maintained correct head and neck support; and whether the baby was shaken or physically abused in other manners. These data are then used in instructive conversations between participants and professionals. The professional uses the data as a point of departure for dialogue and possible common understanding of the challenges that the participants might face in their role as potential parents. This dialogue is typically based on the professionals' normative preconceptions of proper parenthood and is therefore inherently asymmetrical.

Empirical research in the field of robotic babies and their role in the co-construction of parenthood (Søgaard, 2019) supports the claim that a particular normative 'script' is installed in the process of

instructing potential parents in the handling of the robot and the meaning of the robotic 'signs' as they are translated into data.

In an interview with a teacher who was tasked with instructing young parents in the use and meaning of the resulting data, it was evident that important values and normative frameworks were at play:

> So, if you haven't held your baby properly, or [if you have] shaken it, and it has been crying for a long time, it will show how well you've taken care of your baby in percentages, and then we will talk about it. 'What happened Friday night at two […] and what would you think if Margrethe had been a real baby?' (Translated from Søgaard, 2019)

One of the difficult questions in this context is how data derived from the baby robot should be interpreted and assessed within this educational or disciplinary setting. Do the users (the potential parents) understand what is meant by a measurement that makes use of algorithms? Do they properly understand what underlies the measurement of 'good' or 'bad' performances technologically speaking and how it translates to a complex reality? Are these vulnerable citizens given any insight into the limitations of the design of the robot, and the fact that it can only harvest and process a very narrow set of quantitative data derived from a highly artificial scenario?

Clearly, if there is very little information and understanding of the data being harvested and the criteria that are applied, ample room will exist for manipulation on the part of the professional with the risk of entering a slippery slope towards paternalistic practices. That would go directly against the ethos of empowering vulnerable users to make informed choices based on their own values, plans and goals, and the principle of non-maleficence (Beauchamp & Childress, 2001). It would furthermore call for the teaching of professionals in cases where such an ethos is applied to promote reflections on technological assertions and how the seemingly objective data produced becomes anything but objective in the relational discourse between learner and professional.

According to Søgaard's empirical research in the Danish context (2019), marginalised youths are not always properly advised on the criteria for successful process and outcomes prior to their enrolment in the 'test' or 'training programme', depending on the perspective. In some cases, the youths know very little about the relative significance and weight given to each parameter in the overall judgment of their 'performance' and how assessment of the emerging data might come to inform decisions regarding their future parenthood. In some cases, no clear information is provided in advance on who will have access to the person's data both during and after using the robot baby. This increases

the risk of breaching privacy and may erode an already very 'thin' trust in the social worker or health professional.

According to Søgaard (2019), lack of transparency and clarity about the criteria and parameters of judgment permeates the field. This leaves both the client and professionals in a kind of interpretational void. Currently no instructions or guidelines are available in Denmark for professionals on how to translate data from the quantitative scores. Nor are there any common principles on the complex task of making a qualitative assessment of the participants' 'performance' or capabilities as a future parent. The evaluation of each participant is therefore mainly dependent on each professional's subjective judgment, making it extremely situational and prone to prejudice and potential misuse. As can be seen in the social media post below, it can be a difficult professional task to 'calibrate' and define the meaning of performance goals without a shared cultural understanding of what is defined as 'good' in this particular social context:

> I have started using the baby simulator, but have no colleague at work. So far, I have had two courses and they (the participants) have done well (95%-100% in needs met). How do you define that your target group has done well? It will, of course, always differ, but I would like to hear your experiences. (Søgaard, 2019)

This shows the presence of a need and even a concrete demand for proper education regarding how to make sense of the data and apply them in real life settings. Moreover, if the professional's own handling of the robot baby is not guided by moral principles (such as respect for a client's autonomy and dignity) and proper professional restraint, the risk of abuse and strong paternalism increases. In the following example, an educator recalls an incident where strong prejudice towards a client and her capabilities as a future parent led a group of professionals to recommend a punitive approach. Their intention may have been to protect her, her partner and their future child from harm by inflicting what they considered a lesser evil upon her at an earlier stage in her life by adjusting the 'difficulty' setting on the baby robot. An educator elaborates as follows: 'Some of my colleagues have said, this girl, she shouldn't have children, could you please put it on 'really hard'?' (Søgaard, 2019).

Power and robots

The inherently asymmetrical relationship between professional and client is evident in the example above, and so is the abuse of power. If this ethos of mastery and dominance, seemingly based on societal prejudice, were to spread and became widely known by the clients, it would most likely ruin their trust in the social system, making it even harder to reach those on the fringes of society.

In the following, the youth Michelle is clearly reacting to perceived societal prejudice. However, she does so by applying her own strategy of understanding and managing data. Instead of perceiving the production and interpretation of data as potentially disruptive to her view of life and future plans, she sees positive numerical results as a way of documenting parenting skills. In that sense, she uses the measurements and resulting scores to regain some sense of control of the situation:

> Michelle: In the beginning, they didn't have any … fucking confidence in us. Then we had that doll, and I got the result: 93% positive. Then they kind of backed off, because we showed them we can do it [be a competent parent].
>
> Interviewer: How did you feel about being part of the program?
>
> Michelle: I just thought that it was something that had to be done, so we could prove that we could do it? […] The way I see it, I am fully capable of taking care of a baby, I know that. And we produced a good result, and since then they haven't given me such a hard time. (Søgaard, 2019)

Michelle uses data as part of a resistance strategy against existing assumptions of her being a poor mother, thus drawing on the logics, presented by the baby programme itself, that data alone can produce a valid assessment of the qualification of the participants as parents. Michelle's case further underlines the ethical and social challenges in applying data extracted from digital technology within the confines of social professions. This includes the challenge of understanding and interpreting such data, and how data are being used as objective criteria for measuring parenthood and thus may become a tool of power that manifests normative ideas of good parenting.

On such perspectives of being and becoming subordinated by power through the indirect impact of data on social work, Michel Foucault (Foucault, 1983; 1997) and Judith Butler and Bronwyn Davis' reading of Foucault (Butler, 1993, 1997; Davies, 2006) provide inspiration. Through such perspectives, power relates strongly to knowledge as entangled entities where individuals are subordinated through the use of 'objective truths'. A further relationship of power, relevant to the case of the robot baby, is that of subjection: 'Subjection' signifies the process of becoming subordinated by power as well as the process of becoming a subject' (Butler, 1997, p.2). According to this definition – and the simultaneous submission and becoming it depicts – the performance of the participant in the aforementioned case will be subjected through discourses of normality and deviation. This subjection is primarily based on the direct use of (seemingly objective) numerical data, and the importance that such data are assigned in defining good parenthood and assessing the suitability of the participants as parents.

Another point of emphasis is the role of the professional as 'system representative', which gives them definitional power when describing, categorising or subjecting (Butler, 1997) human participants. Based on such 'definitional power', professional estimates assume a privileged position in relation to the handling and interpretation of data. This further translates into symbolic violence, as coined by Bourdieu (1992). The professionals' appraisals and estimates undergo a discursive empowerment as they become indisputable, concrete truths that are difficult for the participants to argue against. However, the cases also indicate a duality in the roles of the professionals. On the one hand, they try to care for the client by helping them understand the challenges of parenthood; and on the other hand, they represent a governmental mechanism with certain responsibilities to society.

Materiality

The term 'materiality' is widely used, misused and debated. In some discourses, the term strongly relates to expectations towards objects or subjects, based on their appearance. In a broader sense, 'materiality' includes how objects can imitate social cues such as speech, emotionality, physical appearance or others, and any expectations one might have towards the subject matter it reproduces (Damiano & Dumouchel, 2018). The term is extensively used in research on social robotics as it relates to the physical materiality of robots, where they adopt certain physical appearances based on humans (anthropomorphic) or animals (zoomorphic). Social robots, however, do not necessarily operate within the boundaries of an anthropomorphic or zoomorphic paradigm; they can also take such cues from literature and media, and thus are inherently designed as mechanical objects (mechanomorphic).

In the case of the robot baby, the baby takes on a clearly anthropomorphic appearance that entails certain projections of materiality where the user might adhere to expectations of human-like subjectivity that are not actually inherent in the technology's binary make-up. Such projections of materiality become relevant when discussing ethics, as these projections entail expectations of the anthropomorphic object, and project some of the same notions of power, mentioned above, as potentially subordinating the user(s). Expectations include projections of qualities, processes of thought, general capabilities and more (Coeckelbergh, 2009; Damiano & Dumouchel, 2018; Fridin, 2014; Fujita, 2001; Ishiguro, 2006; Oriel, 2014). Function seems to have an impact on materiality as well, as some cases show mediation in the human-robot interaction where an emotional bond is based on the function of the robot (Lin et al., 2010). Human attachment to their robot caretaker could potentially be problematic as well (Fridin, 2014; Huber et al., 2016), lending relevance to ethical questions regarding withdrawal of technology from users and specifically the instructions

from implementing parties, such as social professionals. With regard to the robot baby, professionals assign the youths the task of giving the robotic baby a name, thus intentionally drawing on the human-like materiality the technology is designed to reflect to ensure certain behaviours towards it. This entanglement of agency between human subjects and robots is based on the notion of a meaningful relationship that is produced by the materiality. This furthermore establishes the production of potentiality and expectations towards robots as liminal objects, both animate and inanimate, human-like and technological (Turkle, 2011). This ambiguity in the materiality and perceived subjectivity of the robot calls for didactical perspectives for teaching social professionals to relate to and actively involve this entanglement of humanity and robotics, an emphasis in research methodology that has previously been called for (Harraway, 2016; Hasse & Blond, 2017; Chimirri et al, 2018).

The teacher and the robot: reflections on a pedagogy for social robotics in the social professions

From the position of college lecturers, university professors and other professionals tasked with instructing and teaching coming generations of social professionals, integrating social robots into professional practice introduces both practical and more fundamental ethical and social challenges for professionals. The Erasmus+ PRoSPERo project was dedicated to developing an approach to teaching and learning about social robots for social professions that could do justice to the specific challenges such professions may encounter and the settings in which they practice. To develop a better understanding of such challenges, the project hosted two workshops that centred on the robot baby case study; one in Aarhus, Denmark, in May 2019 and one in Valencia, Spain, in November 2019. Workshop attendees were local students and professionals from social work, nursing and other healthcare professions, and in Valencia Vocational Education and Training (VET) teachers and students from both social professions and robotics also attended. The participants were first presented with the case study that involved the use of the robot baby for assessing the parenting skills of marginalised youths. In Valencia, a presentation on using social robotics, the robot COZMO, in special needs education schools was also included. In both workshops, a discussion was then facilitated in a consultative format where participants from different fields were mixed in order to facilitate an exchange of ideas and thoughts.

Both in Aarhus and Valencia, participants showed substantial interest in the practical implications of using the robot baby in the described setting. Their discussions showed both curiosity and doubts about embedding such robots into practice, a general lack of familiarity with social robot technologies for many (but not all) participants and an awareness of the significance of the wider

context surrounding social and professional practice, including social trust and distrust, power dynamics and risks and benefits of intimate surveillance. Substantial cultural differences also emerged across both settings, with Danish participants being more willing to consider such use of the robot baby as a potentially constructive contribution to social work practice, with evident trust in the social system that employed them; opposite, Spanish participants were more concerned about the potential for surveillance and power abuses associated with the technology, expressing some distrust.

Due to the varied representation of students from different VET fields, a workshop dynamic was established, following the Phillips 66 method, where six groups discussed selected topics for six minutes (Phillips, 1948). Participants debated the implications of social robotics for their future careers, their learning outcomes, the ethics and the possibilities of working together in the future in order to provide meaningful technology for the social professions.

Through discussions at both workshops, it became evident that typical concerns presented by Spanish robotics students and Danish educators in software engineering differed greatly from the ethical conversation raised in other fields, such as that of social care. A point was made for integrating such ethical issues in the training of robotics students, and also for including a component on technological knowledge and use of social robotics in the teaching of social professions. Furthermore, by the end of the workshop, it was clear that concerns regarding surveillance of vulnerable citizens were present beyond reference to specific technological solutions (such as baby robots), thus indicating a general trepidation toward surveillance.

Teaching and learning about social robots

Following the experience from the PROSPERO workshops, the project team reflected on the knowledge gained for questions pertaining to teaching and learning about social robots in the social professions. In the following, we use the term ‘didactics’ to refer in general terms to both the art and science of teaching, and not to any one specific method. Concerning the opening paragraph of this paper, one may, from a didactic position, argue that what we are proposing simply installs normative professional discourses. This might be true, but it overlooks the difference in foundations for such an installation.

Teaching and learning about social robots in the social professions requires an integration of specific technologies as case examples, an awareness of the specific, vocational skills required together with appropriate didactical tools. Furthermore, teaching and learning about the deeper meaning of

introducing such technologies into practical contexts becomes essential. In addition to learning about the concrete use of the robot baby technology, wider reflection on the context in which it is embedded is also required, for example, on how using the robot baby with its specific functions and associated data analysis helps establish a normative professional discourse about parenting. In teaching social care professionals to use robot babies, one may provide a potentially effective tool for professional action, but it is essential also to convey to learners how using this technology can impact on existing power dynamics and ethical concerns.

Providing effective learning opportunities on the use of robot technologies is potentially challenging in the social professions that are traditionally centred around interpersonal skills and where information technology is often viewed with scepticism (Kreuger & Stretch 2000, Cziernik et al. 2006), with technology acceptance in social professions depending on a number of variables (Bullock & Colvin, 2015).

While skills for working with information technologies have increasingly been integrated into the teaching and student learning in the social professions, they compete with a multitude of other skills and competencies in the curriculum. It is particularly challenging that technologies are constantly evolving (Bullock & Colvin, 2015) and may quickly become obsolete and cease to be supported. Accordingly, specific skills relating to a particular robot such as the robot baby may not stay relevant for an extended period of time. Therefore, it is essential for students that educators facilitate wider reflections on the use of technology in practical contexts. This further includes how such practices and the experiences of the recipients of their services may be altered by the technology. The focus in teaching and learning should therefore be less on specific gadgets and gizmos than on the wider meaning and impact of these technologies, thus preparing professionals for a future where they are able to make decisions, also regarding technology with which they have no experience. Such decisions require that the teaching of skills, at the very least, is on an analytical, taxonomical level; however, it could also lay the foundation for further elaboration by students, entailing more complex cognitive processes in accordance with their respective levels at the onset of the proposed curricula (Anderson et al, 2001).

The natural follow-up, then, becomes how can this be achieved? One promising approach could be to adapt Mishra and Koehler's modification of Lee Shulman's construct of Pedagogical Content Knowledge, to which they added Technology, to create the TPACK-model (2006). Such a model could be used when teaching and learning within social professions to provide a basis for reflection on technological solutions, options or implementations combined with both knowledge of the field and

in situ pedagogical knowledge. Through this, the professional acquires a set of more general skills for working with technologies beyond their experience.

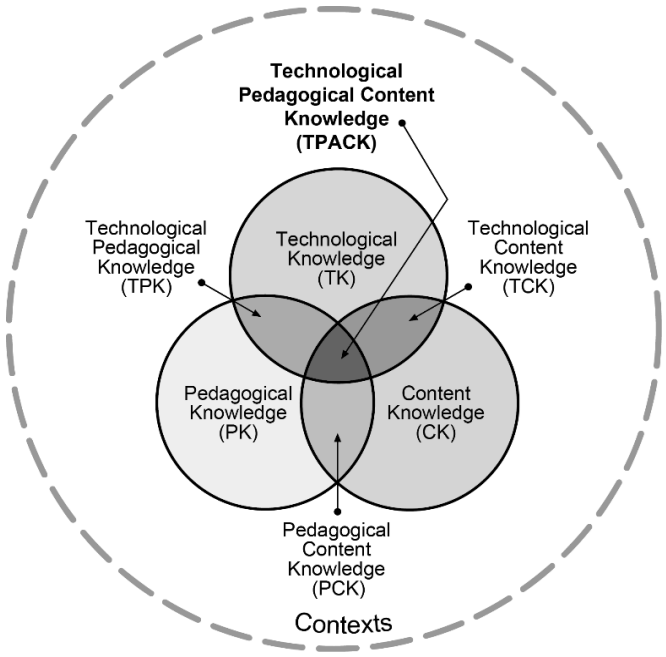


Figure 2. TPACK-model. Mishra & Koehler, 2006

The TPACK model was originally developed for teachers to effectively teach and engage students with technology (Mishra & Koehler, 2006). The three domains within the model represent three knowledge forms. *Content knowledge* is the professionals' understanding and expertise of the subject area; in other words, 'what' the professional knows about their area of expertise (e.g. nursing). *Pedagogical knowledge* refers to the 'how' of the professional – how they act or how they may teach others within the profession, including care recipients. The professional' actions are based on knowledge of methods, assessments and instructional strategies. As the third dimension of the model, *technological knowledge* represents knowledge on and about technology, mostly focusing on specific technologies.

In light of the experience within the PRoSPEro project, we would like to propose a modification of the model by going beyond the question of how best to transmit specified knowledge to learners to move towards the teaching of a wider range of competencies that are relevant because of their implications for increasing use of social robotics. Content knowledge, pedagogical knowledge and technological knowledge by themselves are not sufficient to prepare members of the social professions for the particular challenges that using social robots raises regarding their professional practices. Essentially, the dimensions of the model must be embedded in a wider process of

facilitated reflection on the use of technologies by the profession and the professional, and focus on the multiple meanings produced by such use.

Regarding the content knowledge domain, integrating robots into professional practice opens up new ways of performing professional tasks. For example, the robot baby adds a new instrument to fulfil the social worker's child protection and risk prevention tasks, but also potentially changes the assessment from being an interpersonal process of risk assessment to one of using seemingly objective data collected by the robotic device. Regarding the pedagogical domain, professionals need to be taught in a manner that is appropriate to the subject matter and builds on their learning and practical experience. Situated, experiential learning that allows them to engage with rich case-based, interpersonal scenarios would be an approach to learning that best approximates typical, heavily experiential pedagogies for the social professions (Wayne et al., 2010). Regarding the technological domain, a certain level of knowledge about how robotic technologies and their data processing works will also be needed. This includes understanding, in a basic manner, how inputs (what the robot user does to/with the robot baby) and outputs (the robot baby's responses and the analysed data tables) are related; how users react to and understand these technologies (e.g. through relevant knowledge from HCI research); what potential errors may arise; and what data shortcomings may exist. While students may not always be familiar with the interpretation of data, such learning can be enriching if students can see the relevance to the practice area (Shaw et al., 2012).

As this description shows, this learning process is not just about the 'how to' of the technology in professional practice, but also substantially about the 'what it means' for the contexts of its use. As Shulman (2005) argues in relation to what he terms 'signature pedagogies' for different professions, it is important to pay attention not just to the 'surface structure' of the pedagogy, understood as 'concrete, operational acts of teaching and learning, of showing and demonstrating, of questioning and answering', but also to the 'deep structure', that represents 'a set of assumptions about how best to impart a certain body of knowledge and know-how', and - most clearly representing the wider ethical and social concerns identified above - the 'implicit structure', 'a moral dimension that comprises a set of beliefs about professional attitudes, values, and dispositions' (p.54ff).

The use of robotic technologies needs to be considered in the context of professional identity. Students in the social professions do not just learn a set of new knowledge and skills; they also integrate them into their sense of professional identity, understood as a complex multidimensional construct with a strong value component (Pratt et al., 2006, Trede et al., 2012, Wiles 2013), potentially including the notion of 'practice wisdom' (Thompson & West 2013). Given the focus on

human vulnerability, relationships and care in most social professions, resonating with core care ethical concepts (Kittay 2019), it is especially important to consider how technology can be integrated into such interpersonal professional practice. This is particularly pertinent as technology is sometimes seen as anathema to realising the human side of the social professions, as has been evident in wider discussions about the use of care robots, where concerns about alienation and loss of human contact have been particularly prominent (Sharkey & Sharkey, 2012; Vallor, 2011). These perspectives must, as suggested, be combined with knowledge of technology as a concept, and what role it may play in each specific field rather than focusing on specific technologies as case examples.

Case work on the robot baby: ensuring experiential, reflective learning

Preparing students in a profession for a work life where use of social robots is an expected part of professional practice requires that we provide them with knowledge, experience and educational tools to enable them to handle and understand technologies and the associated challenges and pitfalls. Among other things, the teacher must be able to integrate reflexive learning in addition to providing concrete instructions about the use of social robots. As a methodology for reflexive learning, case-based learning is a very well-established pedagogical method that is popular with students and teachers in the health and social professions with close connections to practical application (Thistlethwaite et al. 2012, Shulman 2005). It is furthermore a particularly common method in the area of professional ethics, where the importance of emotional engagement, interaction and instruction has been identified (Thiel et al., 2013; Schonfeld et al., 2015). It has been highlighted that not all cases are equal, and that selecting cases that include a 'clear description of the social context and the goals of the characters involved' allows students to improve their 'sense-making' and ethical decision-making (Mumford et al., 2008; Bagdasarov et al., 2013).

The case of the baby robot is a particularly apt example as this technology conveys technical and practical aspects together with ethical and social issues, such as the material, physical connection to social robots, the use and interpretation of data, power dilemmas in relation to use of the robot and the impact such use may have on the profession and the professional. In that sense, the case of the robot baby enables reflections entailing technology usage in general, as it connects to the specific social practice, thus enabling reflections that go beyond the teaching of a specific technology.

We would suggest that students ideally be introduced to the robot baby through case-based, experiential learning. They could be given responsibility for a baby robot for a certain number of days to gain hands-on experience of the technology. They could then be assessed with regard to their parenting performance with the robot baby, and they could compare their personal experience with

the data captured by the robot and the interpretation of that data by the assessor. Subsequently, didactic reflection exercises could be facilitated in the classroom to identify students' perspectives on what they felt they learned about the use of robot technology in their professional practice, covering the different domains outlined above. These reflections could include but should not be limited to the following questions:

How was the relationship to the baby robot formed and experienced? The baby robot is designed to appeal to human emotions, which sociologist Shanyang Zhao (2006) also identifies is part of the function of social robots and this further entails the notion of materiality. Thus, the baby robot can be said to function as a kind of 'companion' (van Oost & Reed, 2011), which means that students' emotional interactions with the baby simulator (as if it were a biological infant) create a space of 'cyborg imagination' and practice where they can explore and experiment with new identities and roles as parents. In relation to this, the students can, in a common forum, reflect on the forms of connections or challenges and materiality that arise when interacting with and using social robots. This experience from the subject perspective can help inform future professional use of the baby with future baby robot users. For instance, students' own experience that emotional bonds can emerge between themselves and the baby robot may make them more attentive to the experiences of sadness or personal failure. Sharing different experiences within the class context will also allow coming professionals to appreciate the wide variety of potential responses to the robot, cautioning them to be prepared that future users will not react uniformly. This is in keeping with potential ethical problems concerning user attachment to robots (Fridin, 2014; Huber et al., 2016).

How can data capture parenting capabilities, and who has the authority to interpret these? Through their practical experience, the students may be confronted with discrepancies between their experience of being 'parents' to the robot baby and the data produced by the technology. The data that the baby robot produces creates a knowledge-power tool, that 'uncovers' what may seem to be 'objective truth' about the participants' parenting skills; yet, the data merely represents the specific way that the robot is designed to process data. In this context, Nikolas Rose points out that 'numbers are integral to the problematisations that shape what is to be governed' (1999, p. 199). Thereby, data becomes a co-creator in relation to how reality is perceived, including who and what is measured, and what (normative) decisions this may produce. This awareness of any discrepancies between personal experience and the interpretation of the resulting data may stimulate students' critical reflection on how data can be used in a responsible manner, to what extent the data actually reflects reality and the user's parenting skills and where personal interpretations of the professional users likely enter the equation.

How will the use of the robot baby change the profession? The learning experience of engaging with the robot baby and being subject to data field representation of that interaction can open up reflections on what it means for professionals to employ these devices as part of their professional practice. Professional ethics has traditionally considered the importance of underlying values and virtues for professional practice (Koehn, 2006; Pellegrino, 1996). Students can reflect on which values and virtues may be expressed through or are potentially impaired by using robot technology, and which they consider essential for the profession as they understand it. At the same time, professions are characterised by their use of power vis-a-vis the recipients of services (Powell & Gilbert, 2007; Saks, 2016) and students can be invited to reflect on how the use of the robot baby technology impacts the power structures in the profession and whether this corresponds to how they or their clients perceive the rightful scope of their power. One element of this reflection would be to consider the particular characteristics of their professional and wider social context; this could include critical reflection on whether practices from one context can be transferred to another.

Conclusion

It is the position of the authors that using the robot baby (or similar technology) as a tool with which to assess parenting capabilities in a social work context raises many substantive questions. It is thus a particularly suitable case to upskill members and students of the social professions with robotic technologies, while engaging them in reflecting on the role of social robots for their professional practice. We have presented such a position by explaining the complexities associated with using the robot baby with at-risk youths, as found in an empirical study on the use of the robot baby in a Danish social work setting. This set the scene for reflections on important characteristics of the teaching and learning process regarding this technology, drawing on an expanded version of the TPACK model. Finally, the paper proposed a case-based experiential learning approach for professionals to learn with and about the robot baby in a way that does justice to the practical, technical, ethical and social complexities of robot use in this field.

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