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Publisher: Routledge

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Scandinavian Journal of Disability Research

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/sjdr20>

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Published online: 06 Nov 2014.

To cite this article: Sylvia Söderström (2014): Socio-material practices in classrooms that lead to the social participation or social isolation of disabled pupils, Scandinavian Journal of Disability Research, DOI: [10.1080/15017419.2014.972449](https://doi.org/10.1080/15017419.2014.972449)

To link to this article: <http://dx.doi.org/10.1080/15017419.2014.972449>

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Socio-material practices in classrooms that lead to the social participation or social isolation of disabled pupils

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(Received 3 May 2014; accepted 26 September 2014)

Classrooms are comprised of people, relationships, tools, and technologies, which together constitute the socio-material practices of the classroom. This paper investigates how such socio-material practices influence disabled pupils' opportunities for participation in classroom activities. The paper draws on a qualitative observation study with 14 disabled pupils aged 11–15 years. An actor-network theory perspective was employed in this paper, and the analytical process was inspired by an interpretive content analysis approach. The paper's findings highlight the significance of how education is organized for disabled pupils and how disability and assistive technologies (AT) are perceived. Thoughts and beliefs underlying these phenomena were found to be displayed through (1) location in the classroom, (2) teaching strategies, and (3) implementation of AT. The paper concludes that classroom socio-material practices place disabled pupils in a constant flow into and out of social participation and social isolation.

Keywords: assistive technology; disabled pupils; inclusive education; participation; socio-material practices

Introduction

The prevailing view today is that the separate educational systems for disabled children used in the past should be avoided and that all children should be educated together with their peers in mainstream schools. According to the Norwegian Education Act, every child has the right to attend his or her local mainstream school and to attend a regular class or group at this school (Education Act 1997). Moreover, the goal of the Norwegian inclusive education policy is to provide all pupils full participation in the school environment and school activities, and to remove arrangements that cause devaluation and stigmatization, such as special arrangements for disabled pupils (Tøssebro and Lundebj 2002).

Even though the number of disabled children attending mainstream schools has increased through the practice of what is labelled inclusive education, this does not mean that disabled pupils are fully included in all aspects of school life. Segregation still takes place in many invisible forms (Riddle 2007; Wendelborg and Tøssebro 2010), and this practice most often takes the form of assimilation (Byrne 2013).

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Barriers to an inclusive education are attributed to the persistence of a medical model understanding of disability as an individual phenomenon (Lalvani 2013; Wendelborg and Tøssebro 2010). This is reflected both in school organization and management, by the emphasis on an individual pupil's diagnosis, shortcomings, or deficits as a prerequisite to triggering administrative allocation of money or human resources. In this way, administrative practice maintains the traditional distinction between 'ordinary' and 'special' pupils (Markussen et al. 2007; Kermit et al. 2014).

A decentralization of power, from central school authorities to local school authorities, has taken place in Norway during the last decade. This delegation of power to local school authorities has meant that pupils' education to a greater extent than previously depends on local priorities and variations in available resources. This gives rise to a concern that the spotlight on the ideology of inclusive education might be turned off (Wendelborg 2014). This is most commonly evident through a change in perspective from a relational to a medical understanding of disability as the pupils grow older. While many schools focus on inclusion as facilitation and adaptation of environments in the pupils' early years, in later school years this focus turns to the individual pupil and to individual measures. Thus, segregation of disabled pupils in school increases with age.

Being included is, however, more than being present. Being included in a mainstream school is 'being in an ordinary school with other students, learning the same curriculum, at the same time, in the same classroom, with full acceptance by all in a way which makes the student feel no different from any other student' (Bailey 1998, 184). This means that inclusion is achieved only when the concept has really lost its content and there is no longer any distinction between 'regular' and 'included'.

One practice that may support inclusive education for disabled pupils is the use of assistive technologies (AT) in the classroom (Craddock 2006; Hemmingsson, Lindström, and Nygård 2009; Huang, Sugden, and Beveridge 2009). However, using AT is not only an individual modification, but it also depends on a variety of compatible connections and relationships, including human, technological, and organizational entities (Moser 2003; Söderström 2012). Moreover, several studies have found that AT assigned for use in school is sometimes used as intended, but quite often used less than intended, in unintended ways, or totally abandoned altogether (Murchland and Parkyn 2010; Söderström 2012). This may be due to technical barriers, but most often to human barriers connected to lack of competence or insecurity and attitudes (Lindsay 2010; Smith 2013; Rekkedal 2013). In line with Byrne (2013), who has pointed to the research requirements for identifying barriers within school environments that prevent the full participation of disabled pupils, the purpose of this paper is to highlight the unintentional consequences of everyday socio-material practices in the classroom.

Socio-material practices are everyday actions and interactions carried out by using various human and non-human resources, such as our bodies, analogue instruments, and/or digital tools. A socio-material practice implies that the different resources put to use, whether they are human or non-human, are all actors connected in a network that mutually reinforce each other (Latour 2008; Moser 2006). Socio-material practices may be using AT in classrooms; the question then becomes how the use of AT influences a disabled pupil's opportunities for participation, and how these opportunities affect the disabled pupil. In other words, how is a disabled pupil's participation made and unmade

in specific interactions holding both social and material elements? Thus, the research question investigated in this paper is:

What significance do every day socio-material practices in the classroom hold for disabled pupils' participation in classroom activities?

AT in a Norwegian context

To promote full inclusion and participation for all, Norwegian authorities employ two different strategies. The first strategy is universal design:

One of the main ways of avoiding discriminating against disabled people is to ensure that environments, products, information, websites and services are designed in such a way that they can be used by everyone. This is the crux of universal design as a concept and strategy. (Norwegian Directorate of Health 2008, 2)

In an educational setting, this involves more than physical accessibility for wheelchair users to classrooms and schoolyards. Universal design also involves making the curriculum, information technology, teaching approaches and assessments available for all pupils in a class, regardless of their functioning level or type of impairment. However, for some pupils, universal design principles will hardly meet all needs, and individually tailored accommodation will be needed. This leads us to the second strategy, which is an individual and rights-based national AT diffusion system. Every Norwegian county houses an AT Centre that provides AT, free of charge, to people whose ability to function in everyday life is considerably and persistently reduced. These centres provide AT solutions for use at home, school, work, or leisure for people of all ages (The National Insurance Administration 2003). AT is defined as any item, piece of equipment, or product that is applied to secure, increase, maintain, or improve one's functional capabilities (Wielandt et al. 2006). In an educational setting, this might include individual adaptive technologies such as wheelchairs and mobility aids, writing or reading tools, computers, and different hearing or visual aids, or individualized teaching strategies.

While universal design focuses on general environmental barriers and individual adaptation, using AT is intended as a supplementary adaptation. Accessibility and usability are, however, relational concepts that need to be contextualized in each case (Goggin and Newell 2006). A product's usability can be defined in terms of how effective, useful, and satisfying it is to use. It is the reciprocal relationship between the person, technology, activity, and environments that characterizes the degree of the technology's usefulness. Thus, usability is reflected in the rate of change in function and participation the technology brings (Arthanat et al. 2007).

Theoretical perspectives

The study this paper draws on is rooted in the social sciences and the cross-disciplinary field of Nordic Disability Studies, and it holds a relational perspective on disability. This perspective conceptualizes disability as a social construction that takes place in interpersonal relationships, encounters between individuals and environments, and between individuals and society (Gustavsson, Tøssebro, and Traustadóttir 2005).

Social participation

In the inclusive education debate, social participation has been considered a key issue (Bossaert et al. 2013). The meaning of this term is, however, not always clear, and it needs to be distinguished from other related concepts in order to provide guidelines for the inquiry in question. The concept of participation is defined in a variety of ways. ICF-CY defines participation as *involvement in a life situation* (ICF-CY 2007, 9). In this definition, involvement includes taking part, being accepted, belonging, being included, or being engaged in an area of life or having access to needed resources. This definition has been criticized for being vague and excluding the subjective dimension and experiences. Coster and Khetani (2008) point out that in researching participation, it is important to distinguish activity from participation and to distinguish objective dimensions of participation from subjective dimensions. Witsø (2013) distinguishes between an emotional, a practical, and an intellectual dimension of participation.

In this paper, social participation is conceptualized as social *interaction* in line with Bossaert et al. (2013), who state that social interaction is generally perceived as verbal or nonverbal communicative behaviours towards a classmate or an adult. This may be observed in their free time together, completing tasks together, or in group activities. A lack of or limited interactions are an indicator of social isolation (Bossaert et al. 2013). Depending on the subject of investigation, children's participation can be studied in different ways: talking with children about experiences (emotional participation), observing interactions (practical participation), or including children in the research (intellectual participation). There is a need in inclusive education for more knowledge about the importance of ongoing, intended, and unintended interaction processes during class, i.e., the significance of practical participation. In this paper, attention is given to participation as practical *socio-material interactions* observed during an ordinary school day in regular classrooms in mainstream schools.

An actor-network perspective

In order to investigate ongoing social interactions and simultaneously pay attention to the material dimensions, the actor-network theory (ANT) is employed. In the tradition of an ANT perspective, objects and technologies are perceived as actors with the ability to act and influence actions (Latour 2008). This perspective seeks to reveal what is happening, how it is happening, and what is involved in that which is happening. These conditions materialize in *socio-material practices* in which facts, objects, and nature are not given, but the effects of interactions, relations, and orderings are given (in other words, how a disabled pupil's participation is made and unmade in specific interactions holding both social and material elements). The objects of this paper are the relationships (networks) as they are acted out; i.e., how persons and objects appear in networks of relationships (Latour 2008). Over time, ANT has developed from focusing on network building and production of objects, to focusing on complex socio-material practices and enactments, as well as the collectives that make these practices possible and the actions and identities they enable (Moser 2003).

In the research field of disability and AT, an ANT perspective has yielded important insights into how AT makes the articulation of identity possible, as well as the interdependency between technology and persons in the negotiation of (dis)ability (Moser and Law 2003).

Methodological approach

Participants

This paper draws on a qualitative study with 14 disabled pupils and their teachers. The main sample of disabled pupils consisted of seven boys and seven girls, aged 11–15 years. Six of them had comprehensive mobility difficulties (three girls and three boys), four of them were hard of hearing (two girls and two boys), while two boys had learning difficulties, and two girls were partially blind. The participants were recruited anonymously through a public AT centre. The age group of 11–15 years was chosen due to previous research showing how disabled pupils' participation decreases as they grow older (Wendelborg and Tøssebro 2010). Further inclusion criteria were allocated AT for use in school and attending a local mainstream school. Potential participating pupils and their parents received an informational letter explaining the content and purpose of the paper, including a consent form. The information letters were sent out by the AT centre. Those who wanted to participate filled out the consent form and returned it to the researcher. The participating pupils and their parents were asked for permission to contact the child's school management and teacher for observation during a school day. First, the parents and pupils gave their consent, and then the requested schools and teachers gave their consent. The research was registered and approved by the Norwegian Social Science Digital Register. Table 1 gives a short overview of the 14 participants and summary of categorized findings related to each participant.

Table 1. Overview of participants and summary of categorized findings related to each participant.

| No | Name | Age | Impairment | Main category of findings |
|----|-----------|-----|------------|------------------------------|
| 1 | Berit | 14 | Mobility | Location in the classroom |
| 2 | Geir | 13 | Mobility | Location in the classroom |
| 3 | Ivar | 15 | Mobility | Location in the classroom |
| 4 | Joachim | 14 | Mobility | Location in the classroom |
| 5 | Kari | 13 | Mobility | Location in the classroom |
| 6 | Laila | 13 | Mobility | Location in the classroom |
| 7 | Mona | 15 | Vision | Location in the classroom |
| 8 | Nina | 13 | Vision | Location in the classroom |
| 9 | David | 13 | Hearing | Teaching strategies |
| 10 | Eva | 12 | Hearing | Teaching strategies |
| 11 | Fredrikke | 11 | Hearing | Teaching strategies |
| 12 | Håkon | 12 | Hearing | Teaching strategies |
| 13 | Carsten | 13 | Cognitive | Implementation of technology |
| 14 | Anders | 11 | Cognitive | Implementation of technology |

Data collection

The data consist of observational field notes from observations of socio-material practices during an ordinary school day, and field notes on the significance of these practices in the disabled pupils' participation in classroom activities. Furthermore, the data consist of notes from field conversations with teachers. Since socio-material practices within the classroom were in focus in this paper, the pupils themselves were not interviewed. Thus, their subjective dimension of participation is not accounted for in this paper. In this paper, I report on findings derived from observations of socio-material practices in classrooms and from field conversations with teachers.

The purpose of using observation as a data collection method was to obtain close insight into the socio-material practices taking place in the classroom during an ordinary school day. Observation was perceived as suitable for investigating the discrete interactions between pupils and between pupils and teacher, as well as how the pupils related to material objects in the classroom (Angrosino 2005). Each of the 14 pupils was observed during two school days, first during one school day and, after a few weeks, during a second school day. Between the two days of observation, field notes from the first observation were preliminarily analysed in order to bring relevant details into focus for the second day of observation. The observations were focused around subjects such as positioning and movement in the classroom, the use of AT, interactions between the disabled pupil and other pupils or the teacher, and behaviours acted out. Field notes were taken continuously during the observations, and complementary notes were made immediately after the observations. The field notes were structured in the following three columns: one for what actually happened, one for associations the actions brought forth, and one for possible theories for analysis of the actions.

During the observation period, I (the researcher) was positioned at a distance from the pupils and teacher, most often in the back of the classroom, but sometimes alongside the disabled pupil. At the beginning of the day the pupils in the class often looked at me, but after some time they seemed to forget about me. The teacher and the participating disabled pupil knew why I was present, but I was introduced to the class as a visitor interested in teaching.

Analysis

To analyse the data, I employed an approach within qualitative interpretive content analysis (Graneheim and Lundman 2004). The aim of the paper and its theoretical perspectives guided the primary coding procedure. The field notes and notes from field conversations were read, re-read, and then organized into what was happening, how it was happening, and actors involved. The happenings were then categorized according to the disabled pupils' participation in the happening, leading to the following categories: (1) equal participation; (2) in and out of participation; and (3) lack of participation. Finally, a search for a deeper understanding of what causes the happenings was conducted, leading to the categories: (1) location in the classroom; (2) teaching strategies; and (3) implementation of technology. These categories illuminate how socio-material practices in classrooms created dynamic connections that sometimes led to disabled pupils' participation in classroom activities and sometimes to social isolation.

The findings presented in this paper draw on quite a small sample, and the data collection is qualitative in nature. Thus, the findings generated may not necessarily be valid for all socio-material practices in classrooms. However, the findings bring insights into circumstances and details of practices in the classroom that most likely hold relevance for other disabled pupils attending mainstream schools and regular classroom settings.

Findings

The current paper's findings highlight the significance of how education for disabled pupils is organized and how disability and AT are perceived. Thoughts and beliefs underlying these phenomena are found to be displayed through the following categories: (1) location in the classroom; (2) teaching strategies; and (3) implementation of

technology. These findings are crucial for the everyday socio-material practices that take place in the classroom. Moreover, they turn out to be contextual and dynamic, holding simultaneously opportunities for and barriers to participation.

The findings elaborated on in the following are illustrated with extracts from 3 of the 14 participants. These three extracts are found to be typical, and regardless of kind of impairment, when it comes to common socio-material practices and implementation of AT in classroom activities.

Location in the classroom

Where and how a pupil is positioned in the classroom in relation to the teacher and other pupils form a basis for his/her learning and collaboration. This applies whether the pupil has an impairment or not. The need to give special attention to location vary depending on the individual pupil's need for accommodation. While hard of hearing pupils need some kinds of accommodation, short-sighted pupils need another kind of accommodation, just like cognitive challenged pupils and pupils with mobility difficulties need yet another kind of accommodation. However, they all need some special consideration of location in the classroom to be able to make use of their potential. This became especially evident during the observation of Joachim. Joachim is a 13-year-old boy having a progressive muscle disease and thus comprehensive mobility difficulties. He uses an electrical wheelchair to get around both outdoors and indoors. Joachim has no cognitive or linguistic difficulties and has no special education needs. During my days at Joachim's school, I observed the following:

Joachim is seated in his electrical wheelchair in the back of the classroom alongside three other boys. It is quite spacious around Joachim's desk so he can move around freely in his wheelchair. The teacher gives the class some instructions for group work and how the pupils should work during the lesson. Joachim turns in his wheelchair towards the other boys in the back row, and they put their heads together. For a while they talk together while they browse some books. Joachim then starts taking notes on what they have agreed to on his computer.

The boys in the back row collaborate in solving the group work assignment through talking, reading, and making notes. This collaboration requires being seated close to each other. This setting highlights the connections between humans (the pupils), objects (books, desk, etc.), and technologies (wheelchair, computer), and how these connections constitute a socio-material practice that is contextual (group work assignment), dynamic (task solving), and relational (collaboration). In this context, Joachim's location in the classroom facilitates his participation in classroom activities and allows him to display his abilities as a competent classmate.

Upon asking Joachim's teacher how and who decided where Joachim should be seated in the classroom, she answered, 'This was decided even before he joined us, by the support team, I think. It is a practical solution due to his wheelchair, but also important to have his friends close by'. Disabled pupils' participation in classroom activities requires purposeful planning of their location in the classroom that can serve to avoid their location in isolated work spaces. Furthermore, the location in the classroom of a disabled pupil and his or her AT is of importance to their opportunities to interact with classmates and participate in classroom activities (Murchland and Parkyn 2010). However, Joachim and his classmates are not always in their regular classroom; quite often they move to other teaching areas, and the next lesson took place in a small auditorium.

In the small auditorium, Joachim was located in his electrical wheelchair on the floor in the front row below the auditorium's rows of chairs. The other pupils sat in the rows behind and above Joachim. In this lesson, I observed the following:

The teacher is standing and talking and moving around. Most of the time she stands close to the first row of seats, then she is actually standing behind Joachim. Consequently, Joachim is sitting alone in his wheelchair in the front, with no desk or table, with all his classmates and also the teacher for a large part of the session behind him. The pupils are assigned individual writing tasks. After some instructions they start on their assignment and it becomes quiet in the auditorium. After some time, Joachim stops writing. At this point many of his classmates have started to whisper together, some about their assignment and some about other things; only a few keep on writing. Joachim sits alone, does nothing, and stares at the wall.

Joachim's location makes it impossible for him to participate with his classmates in the whispering and discrete interactions that occur during the lesson. In addition, the teacher's moving around behind Joachim excludes him from the group. While the purposeful planning of location is found to be the case when it comes to all of the participating pupils' regular classrooms, this is usually not the case when they move to other teaching areas during the school day, which most of them do a lot. Joachim's teacher was asked about this and she answered, 'Well, we got the largest classroom because of Joachim, but sometimes we have to move around. Then we just try to make the best out of it'. This excerpt regarding Joachim's school day illuminates how his opportunities for participation and interaction emerge as contextual dynamic connections between environments, locations, AT, and humans. Østensjø, Carlberg, and Vøllestad (2005) point to the importance of environmental modifications in promoting disabled children's social functioning. Environmental modifications may be AT, but also any kind of fixed or removable adaptations and locations used to maximize the child's performance of daily life activities. When an environmental area changes the need for modifications change, and if this change is not accounted for, opportunities for participation also change. Pupils who depend on large or several different types of AT are especially vulnerable to changes in environmental areas, such as changes in classroom environments. This applies directly to eight participants in the current paper depending on large AT. However, this also applies to the other participants who use smaller AT at school, such as the four participants who are hard of hearing.

Teaching strategies

Opportunities for participation were realized by alternating dynamic connections, as well as when the location of the pupils in question was well planned and the classroom and AT were well adapted. The challenge for many teachers was, however, to employ teaching strategies that continuously support the disabled pupils' participation during the dynamic of socio-material practices in the classroom. This was especially evident when the locations or activities changed, and particularly in the case of the four pupils who were hard of hearing and dependent on hearing aids. These AT were all integrated appropriately in the classroom environments, and also into the teachers' teaching strategies, the latter at least in theory. The significance of the teacher's constant awareness and purposeful use of AT is illustrated here by an excerpt from the observation at Eva's school. Eva is an 11-year-old girl who is hard of hearing:

Eva sits in the middle of the desk column by the window. She is wearing hearing aids and a body worn FM receiver, the teacher is wearing a microphone headset, and all pupils have handheld microphones. During the lesson, the teacher starts teaching the class at the blackboard. When pupils answer the teacher's questions, most of the time they do not use their microphones. Sometimes the teacher reminds them to do so, and sometimes she doesn't. After a while, the pupils start working individually and the teacher walks around to help individual pupils. At this point the teacher has turned off her microphone. Some of the pupils start talking together, and sometimes a pupil asks a question out loud, and the teacher answers out loud, but now none of them use their microphones. Eva is working on her assignment, but she spends more time looking around in the classroom at pupils talking to each other than at her assignment.

The teachers and pupils constantly shifting between use and no use of the microphones excludes Eva from vital parts of teaching, such as clarifying details and the provision of specific examples. In addition, the pupils' lack of microphone use in small talk deprives Eva of the possibility of participating in their social chatter. In this context Eva is constantly pushed into and out of the flow of conversation in the classroom, based on whether the teacher and pupils use their microphones or not.

It seems as if the teacher is aware of the significance of using the microphone when she teaches the class as a whole, but she forgets the significance of this technology during the spontaneous dialogue that occurs between her and the other pupils. In answer to my question about microphone use, she replied: 'I try to use it the whole time, but I easily forget when I am not at the blackboard'. This not only reveals an awareness of including Eva in the class' joint teaching but also a lack of recognition of the significance of Eva being included in the spontaneous talks, whispering, and discrete interactions during a lesson. This may be interpreted as an underlying perception of disability as an individual phenomenon, requiring teaching strategies directed at individual pupils and not when addressing others. Such an interpretation corresponds to previous research that attributes barriers to classroom participation in school via the persistence of a medical understanding of disability in the perception and practice of teachers (Boer, Pijl, and Minnaert 2011; Lalvani 2013; Shevlin, Winter, and Flynn 2013).

Implementation of technology

All of the teachers in the current paper expressed positive attitudes towards inclusion and use of AT. Nevertheless, it sometimes turned out that the teacher perceived making use of the AT as too troublesome. During the observations of the two pupils with cognitive difficulties, it became apparent that the AT provided were totally abandoned. One of these pupils was Anders, an 11-year-old boy with moderate learning difficulties. Anders has trouble understanding time and space, and he has poor short-term memory, thus he has been allocated a Memo Planner. This is a colourful digital board designed to hang on the wall in his classroom. The Memo Planner is supposed to help him gain an overview of all the activities at school during the day by visualizing the different activities, as well as what time and where the activities take place. During my observation at Anders' school, I did not see the Memo Planner anywhere. When I asked the teacher for it, she explained, 'We don't use it because Anders gets so preoccupied by the Planner's lights, colors, and buttons'. Asking, further, if she had tried to make Anders familiar with the Memo Planner, she answered, 'There is no time to spend a lot of time getting to know new technologies'. To be familiar with AT takes time, and to learn how to utilize its potential takes time, and time is scarce for most teachers. None of the teachers in the current paper

were provided with any extra time to prepare to use the AT. This was given explanatory force for not employing the AT. However, many teachers are not aware of the potential AT holds or how to use them to advantage (Dobransky and Hargittai 2006). During the observation at Anders's school, I observed the following:

At the end of each recess, the teacher comes out to bring Anders to the classroom of the next lesson. I do not observe her talking to Anders about what or where the next lesson will take place. During the different lessons Anders is located in different places in the different rooms. He appears to be occupied with his own things, such as fiddling with his pencil, scribbling in his book, or playing with his eraser. Only occasionally is he talking with any of his classmates. On a few direct questions from the teacher, he will not answer.

Anders' participation in classroom activities was observed to be very limited, if not completely absent. Even though Anders was seemingly a natural part of his class, there was no, or minimal, interaction between Anders and the other pupils in the classroom, nor was Anders engaged in classroom activities. Applying the ANT perspective on the socio-material practices taking place in Anders' classrooms revealed that the teacher's use of blackboard, oral messages, and writing assignments was insufficient to make Anders participate in the classroom activities.

Even though implementing AT may be initially time-consuming, the use of AT in the classroom is found to be dependent on teachers' willingness to integrate them in their teaching strategies. The more positive a teacher is towards technology, the more likely he/she is to integrate AT in the classroom (Rekkedal 2013). Several studies have found that it is not unusual for AT assigned for use in school to be abandoned (Murchland and Parkyn 2010; Söderström 2012). This may be due to frustration with AT for not working as expected (Pape, Kim, and Weiner 2002; Söderström and Ytterhus 2010) or to a teacher's lack of time, interest, or knowledge when it comes to technology (Söderström 2012).

Discussion

This paper highlights how location in the classroom, teaching strategies, and implementation of AT in classroom activities make a difference in disabled pupils' every day at school. In sum, this difference turns out to be about practical details in specific situations.

If location in the classroom is to facilitate the inclusion and social participation of disabled pupils, it requires purposeful planning and organization, in terms of both universal design of the school environments and individual adaptation to the individual disabled pupil, often by the implementation of AT. As illustrated in the case of Joachim, universal design of one classroom or one part of the school environment may not be enough. Especially as the pupils grow older, they move around more and more to different locations within the school, and thus universal design of the whole school environment is required. However, the pupils' locations in and uses of a perfectly universally designed environment is still of great importance for their opportunities for inclusion and social participation. This applies not only to disabled pupils, but also to all pupils, as illustrated in the first excerpt of Joachim's collaboration with his classmates in the back row.

However, sometimes universal design is not enough and additional individual adaptations are required. In most of these cases, an implementation of AT is recommended, as in the case of Anders. When a pupil is allocated an AT for use in school, the pupil's teacher most often needs some training in how to use its core functions. Such training are offered by the AT centre or by the suppliers of the

technology, though often without teachers being aware of this (Söderström 2012). Even though some teachers do a very good job in individual adaptation by implementing AT, they are still quite dependent on the school administration's support. Securing disabled pupils individual adaptation where a universal design strategy is not enough requires a combination of thorough planning, collaboration, competence, and often also implementation of AT.

One of the greatest obstacles to making education truly inclusive is, however, found to be the persistence of a deficit-perspective on disability and a subsequent individualization of disabled pupils' education (Gable 2013; Lalvani 2013). This also seems to be the case for the participants in this paper, illustrated in the case of Eva. Even though the teacher and Eva's classmates used microphones in class, the teacher's overall teaching strategies remained unchanged. This was evident by her use of microphones almost exclusively when Eva was specifically approached. Changing teaching strategies to naturally include the individual adaptation for one pupil in all aspects of classroom activities is not an easy task. Before reaching the point of natural integration, constant awareness on the teacher's behalf is required. Taken together with the little guidance teachers receive in developing inclusive educational strategies, their challenge is illuminated.

Conclusion

While the socio-material practices of using AT in the classroom are intended to facilitate the participation of disabled pupils, the inattentive moments of non-use of this technology place disabled pupils in social isolation. The current paper find this constant shifting between the use of AT and non-use to characterize the socio-material practices of classroom activities in mainstream schools. Disabled pupils in need of AT and attending mainstream schools are thus exposed to a constant flow into and out of social participation and isolation during one and the same lesson or school day. Further research should investigate the consequences, educationally and socially, of this constant flow.

While several studies find that even though disabled pupils are included in mainstream schools, they are more or less excluded from regular classrooms (Riddle 2007; Wendelborg and Tøssebro 2010), the current paper finds that even when disabled pupils are included in regular classrooms, this does not necessarily mean they are participating in classroom activities or interacting with classmates. Inclusive practices are at risk of taking the form of mere assimilation, which in practice actually involves a covert segregation process. This may be due to the dominant conceptualization of inclusive education as a *place* (Lalvani 2013); i.e., when a disabled pupil is located in a mainstream school and a regular classroom, inclusive education has been achieved. The case is rather contrary; providing opportunities for disabled pupils' participation in mainstream schools and regular classrooms require the conscious and purposeful use of the environment, regular objects and teaching tools, AT, and human resources through the everyday socio-material practices in the classroom.

Inclusive education continues to face barriers. While barriers to disabled pupils' participation in the classroom previously have been attributed to the persistence of a medical understanding of disability (Lalvani 2013; Wendelborg and Tøssebro 2010), this paper highlights how these barriers may just as well be due to a lack of awareness of the significance of socio-material practices within the classroom. This leads to classroom practices that put disabled pupils in a constant flow of moving in and out of participation

and isolation. The necessary accommodations, adaptations, and knowledge for providing disabled pupils' social participation in the classroom are not yet in place within the inclusive education system. If the educational system is to be truly inclusive, there is a need for a change that brings practice closer to ideology. This involves an inclusive turn; i.e., addressing and challenging the perceptions and thinking behind the practice.

Funding

This work was supported by the Priority Area of Participation at Sør-Trøndelag University College, and the Program for Physiotherapy Education at Sør-Trøndelag University College.

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