Problems encountered by science teachers in wheelchairs

Lyn Haynes and Maria Turkenburg

ABSTRACT Teaching science, and learning to teach science, is a challenge at the best of times and, if the teacher is a wheelchair user, the learning curve is significantly steeper. How can school-based mentors, line managers (including senior leadership) and heads of science, along with university science teacher educators, support wheelchair users who are teachers (or trainee teachers) of science? In this article suggestions are made based on the experience of four wheelchair users.

Background

The majority of the problems faced by teachers who use wheelchairs are general issues around the school, but all these (potential) barriers impact on a teacher's development towards becoming an exemplary teacher of science. The scenarios that appear below have been shared by teachers who are wheelchair users, to whom we extend our thanks for providing us, their colleagues, with some insight into the barriers they constantly experience and some solutions. Much of what is presented might seem to be obvious, but are we really aware of these everyday norms that could be a barrier to the teacher in the wheelchair? Ignorance has no standing in law and should not be permissible in educational institutions.

Through our combined experience working as a university science teacher educator (Lyn) with Martyna, a trainee science teacher, and Clive, an experienced chemistry teacher, both of whom are wheelchair users, and working as a teacher support worker/personal assistant for wheelchair-user Cheryl (Maria, funded by Access to Work), and through discussions with other wheelchair-using colleagues, it became evident that only a minority of the problems they all encounter in school are actually science-specific. We also 'recruited' Vanessa, another wheelchair user, at an Association for Science Education Annual Conference, as well as Chris, Maria's university science teacher educator, to guide and inform us with this work. Access to Work (www.gov.uk/access-to-work/overview) is a government-funded scheme to provide grants for practical help for a disabled person in the workplace.

In this article, reference to 'teachers' will mainly refer to science teachers who use wheelchairs, but this narrow focus does not negate the extremely broad range of impairments suffered by many of our teaching colleagues, which add to the enormous demands of being a teacher, not just a teacher of science.

Situation

Generally, the arrangements in UK schools to meet the needs of learners with special educational needs and disabilities (SEND) have continued to improve over the past two to three decades. This view is corroborated by Cheryl, who said: '*I find the school is set up very well for disabled pupils but much less so for disabled staff*.' In September 2014, the new Education, Health and Care plans came into force; these place different emphases on pupils with SEND, but may provide an avenue of financial support for trainee teachers as the funding is for 0- to 24-year-olds. Even now in tertiary education institutions, accommodating SEND students is evolving, albeit slowly.

There exists a disparity, however, when it comes to staff members who have any impairments (the preferred term as opposed to 'disabilities') and the level of support and reasonable adjustments that are instituted. Naturally, the degree to which support is available and/or forthcoming differs from institution to institution. It is also critical to realise that there is no 'one-support-strategy-suits-all' solution. Each impairment might present a wide range of symptoms, often including some that are not visible.

In this article, the problems encountered by teachers of science who are wheelchair users,

whether trainees or experienced, are explored. A critical point of departure is that a teacher with impairments has as much to offer the learners, department and school as a teacher without impairments: we need to capitalise on this relationship and be proactive. It is proposed here that all teaching colleagues and management need to adopt a positive or growth mindset that will enable us to move towards providing real support for teachers in wheelchairs, while valuing their input to the maximum.

Coverage in the literature

Burdett (1992) compiled a booklet encapsulating ideas for training science teachers and support staff on how to integrate physically disabled pupils into mainstream science lessons. This resource clearly followed on the back of the 1987 Warnock Report recommending the integration of disabled pupils into mainstream schools, and the implementation of the new National Curriculum for Science in 1998. Perusal of Burdett's resource pack shows that it would be easy and highly relevant to substitute 'physically disabled teacher' for 'physically disabled pupil'. For example, she sets out a workshop for raising colleagues' awareness of the difficulties experienced by pupils with physical disabilities or restrictions, through exploring the problems encountered and laboratory logistics, and taking action (Burdett, 1992: 6–10). While Burdett's suggestions about raising awareness are pertinent to teachers catering for the special needs of their learners, there remains a desperate need to raise awareness of how to support a teacher with special needs.

Two decades on, little has been done to address the needs of science teachers in wheelchairs to enable them to support all their learners in the science lab and lessons. This article hopes to bring to the attention of science departments, their subject leaders and senior leadership in schools a way of thinking differently and to change their mindsets about colleagues with impairments. A salient point raised by Burdett is that '*each pupil shows individual problems and so requires individual solutions*' (Burdett, 1992: 9), a point reiterated by Carmichael (2013), who writes '*there is no one-size-fits-all solution*', something that Vanessa stresses. There are, however, legal guidelines. Are these being adhered to?

The Disability Discrimination Act 1995 states that '*a person has a disability for the purposes of this Act if he or she has a physical or mental impairment which has a substantial and long-term adverse effect on his ability to carry out day-to-day activities*'. The 1995 Act also stipulates that employers are required to make '*reasonable adjustments*' to premises or working practices to ensure that employees are not disadvantaged because of their disability. The Equality Act 2010 restates the above.

At the time of writing in 2014, there remains a dearth of literature specific to supporting (science) teachers in wheelchairs, although the STEM Disability Committee is working in conjunction with multiple STEM (science, technology, engineering and mathematics) professional bodies to support university students and address some of these issues. So, why does it feel as if we are still pushing to implement genuine support for teachers two decades after the 1995 Act? As 8% of all science graduates in the UK have declared disabilities and most should have received the support outlined by Carmichael (2013), a proportion of these can be expected to consider entering the teaching profession. Schools therefore do need to listen to their teachers with impairments and amend existing reasonable adjustments to address the specific needs of the individual.

Scenarios and ideas for proactive solutions and/or support mechanisms

It is hoped that the experiences and thinking proffered by teachers in wheelchairs shared in this article will enable all other science teachers and educators to be better informed as to how to implement reasonable adjustments and thereby support teachers in wheelchairs more effectively. Box 1 provides some background to three of the four contributing teachers.

The teachers raised issues and proffered some solutions related to entry and egress from teaching and meeting rooms, the nature of the duties that they should be expected to do in the light of parity of staff workload and reasonable adjustments, as well as issues associated with fire and fire drills.

An aspect raised that is directly pertinent to science is about who should prepare the teaching room for the teacher. Cheryl explained that:

I am privileged to be in a mostly new-build school, and was appointed the most accessible lab, but this was a mixed blessing. It can be as much a hindrance to have all your school

BOX 1 Background of three of the contributing science teachers who are wheelchair users

Teacher	Background
Cheryl	Cheryl's condition is such that it easier for her to use a wheelchair than crutches; she also has an assistance dog.
Clive	Clive has only recently required the use of a wheelchair after many years of being an able-bodied, outstanding teacher in the same school. He can walk using sticks but is very unsteady on his feet. His state-of-the-art electric wheelchair can be raised for him to access materials in drawers, on shelves, etc., and to see all the learners in the room. Even better, it can raise him into a standing position, enabling him to do titrations and other chemistry experiments at normal, standing eye-height. Consequently, his wheelchair is large (1.35 m × 0.65 m) and can turn in 1.35 m. Clive's learners are 'well impressed' with what his electric wheelchair can do, and stated openly that Clive being in his wheelchair made no difference to them and their learning compared with any other teacher.
Martyna	Martyna was on an employment-based route into training as a teacher that required her to teach up to 70% of a full timetable without any classroom assistance from 1 September. She had been schooled abroad so was not familiar with the English education system, which added to the difficulties of learning to teach.

activities decided by your disability as not having them taken into account at all. … The teacher's lab should be set up from scratch in genuine discussion with the teacher.

Vanessa's sagacious advice on this matter is that if one leaves all the planning and preparation to the school and Access to Work to accommodate a new science teacher in the department then the provision is more likely to be poor and add difficulties to the job. She stipulates the need for a thorough review to be undertaken by a technical adviser. Advice from occupational therapists tends to address ergonomic aspects but miss the practical aspects of a working science lab.

Further considerations that should be taken into account when preparing for the arrival of the teacher on the staff include the type of 'reasonable adjustments' that could be made in the teaching room. Figure 1 shows how Clive is able to access the pupils when using his wheelchair in his teaching lab, as observed by the first author when she worked with him there. He was, however, admonished by the senior leadership team (SLT) during observations for not going to the side of each pupil. Box 2 presents other barriers experienced and shared by the four teachers.

If the preparation of the teaching room has been discussed with the teacher and their specific physical needs taken into genuine consideration

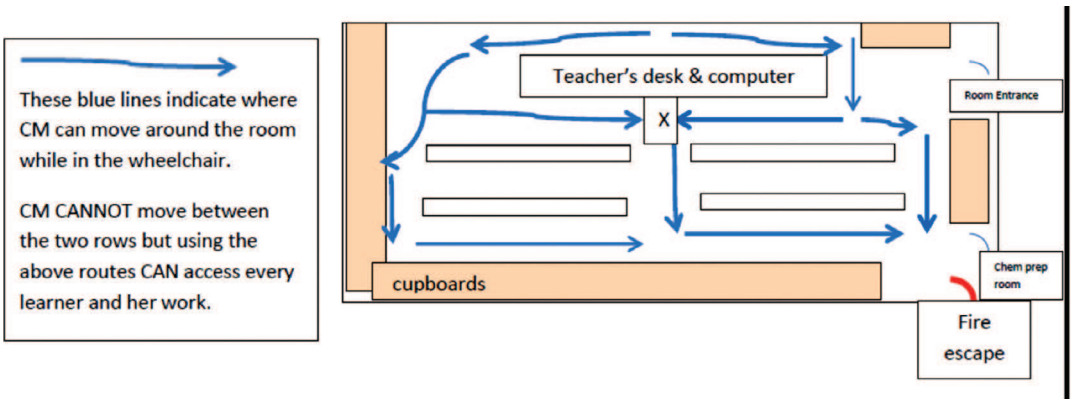

Figure 1 A 'route map' indicating that Clive can access every pupil in his teaching room

then the wellbeing of the teacher needs to be considered, discussed and changes implemented. Wellbeing considerations include the location of a fully functional disabled toilet, and whether the timetable takes into account the fact that some teachers might require more than the 20-minute break to see to personal ablutions. Where can the teacher get access to break-time drinks and where can these be consumed, bearing in mind that there should be 'no eating' in science labs? Is there any

BOX 2 Issues, considerations and possible solutions on a one-solution-suits-one-teacher basis that could provide a point of departure for your department and school for making reasonable adjustments

Potential teaching and learning barriers and difficulties	How the teachers were or may be affected by these barriers	Solutions, ways to support the teacher or think differently
Can the teacher circulate around the teaching room and have access to all learners to provide individualised support? Is this really necessary?	Clive uses a state-of-the-art electric wheelchair so moving around his teaching lab is possible but not seamless (Figure 1). This has caused controversies with SLT who believe that he might be neglecting his duty of care to his learners. In his recent performance-management observations he was criticised because he was stuck in one part of his lab for the majority of the lesson. Clive was an able-bodied and consistently outstanding teacher prior to his illness: now he still teaches the same way but was awarded 4s (Ofsted: Unsatisfactory) because of his 'limited' physical movement within the lesson. The most terrifying outcome of his SLT's perceptions is that they brought Competence Procedures against him. Clive 'lost' the fight and took redundancy after more than a year of enduring the lack of support from SLT.	Get into the teacher's wheelchair and move around the room for yourself. Aim not to observe/inspect the teacher's lessons from your own (able-bodied) point of departure. Try to take on the teacher's mindset and world view in order to find solutions to support the teacher. Does the teacher need to be further penalised for matters beyond their control?
Position of the learners' heads relative to the head height of the teacher	Martyna was uncomfortable that the pupils were seated at high tables on high stools and were thus way above her head height. It was the pupils 'looking down on her' that unnerved her somewhat as a beginning teacher.	Martyna reported that '*The science tables were changed into much lower ones, which helped establishing authority in the room (at the start I was always the shortest person in the room and people struggled to see me). The teacher's desk was also lowered and arranged so that I could carry out demonstrations more easily*.'
Using the whiteboard and/or interactive whiteboard (IWB) and internet resources	Can the teacher access the IWB and write on it, particularly if there is no whiteboard on which they can elaborate a teaching point? Can the teacher use internet-based resources with the same ease as any teacher? Cheryl said: '*I have a smart board which I cannot reach so I use a graphics tablet to write on it and a wireless presenter to control presentations. I also have a standard whiteboard that I struggle to write on*.'	Provide the teacher with a tablet/graphic pad that has wi-fi/cable-free connection to the internet, PC and IWB. An old-style rolling whiteboard would enable the teacher to use it with greatest ease.

BOX 2 *(continued)*

Potential teaching and learning barriers and difficulties	How the teachers were or may be affected by these barriers	Solutions, ways to support the teacher or think differently
Access to the computer while teaching and to do school work, e.g. planning and data entry, etc.	Where in the teaching room is the computer positioned? Can the teacher access the computer to take the register, display the teaching and learning resources prepared for the lesson, or to expound on a point?	Provide the teacher with a tablet from which the IWB can be operated. Funding can be sought from the Royal Society of Chemistry or Institute of Physics.
Photocopying and printing: Is the teacher able to use the photocopier from the wheelchair?	The operating buttons on a photocopier are usually above a metre high so are out of reach and sight of someone seated in a wheelchair. Cheryl reported: '*My greatest asset is my PA* [Maria]*, whom I had to fight for because my school were convinced that I wouldn't find anyone to work for four hours. I should be entitled to more, but all my legwork like photocopying, making sheets and printing as well as mail outs and postcards home are done by her. This allows for the increased time I spend doing things like book marking because of my disability*.'	See the ATL (2010) guidance on the Equality Act 2010: '*Changes to working arrangements may be made by: employing an assistant to undertake administrative tasks*'.
Height of shelves and opening doors	Vanessa raises the point that your perspectives change rapidly once you are so low down and cannot push doors open easily or reach for things on the floor, on shelves and sometimes even on desks.	Lower shelf and pigeon-hole height. Install door actuators.

opportunity or physical space for the teacher to meet and/or socialise with colleagues? The most striking issue relating to wellbeing was about attitude of the staff compared with the students. Cheryl shared the following:

The biggest obstacle has to be attitude. My school is a mixed bag and the challenges I face from attitudes are as difficult as the physical. Having said that, by pupils I have been treated as 'normal', without exception, from day one. I did not expect this. It wasn't until about six months into my job I was asked by a student why I was in a wheelchair. Food for thought!

In seeking solutions to such issues, Speechley and Wheatley's (2001) concept of 'Developing a Culture for Diversity' could come into its own. Able-bodied staff need to realise the added value that a disabled colleague brings to the culture, ethos and day-to-day reality of a school. Staff need to unpick the prejudices that have been reported by the teachers in wheelchairs. Cheryl was not the only person to highlight staff prejudice in school.

Science-specific teaching issues

After collaboration to provide bespoke reasonable adjustments and consideration of support for everyday teaching, it is essential to consider the science-specific barriers raised by the teachers and ideas for addressing these, as presented in Box 3.

External solutions/support mechanisms

Frequently repeated comments from the contributing teachers concerned the attitude of the other adults towards staff in wheelchairs, while the learners tended to be more accepting of the situation. Therefore, there needs to be a shift in colleagues' thinking around teachers with impairments and the barriers they experience to their everyday work as a teacher. This might be viewed as a paradigm shift, but it is long overdue.

The framework for business management, 'Developing a Culture of Diversity', developed by Speechley and Wheatley (2001), is how we in education and, in particular, schools, need to move forward to fully include and cater

for our colleagues with impairments. Such an approach might help teachers in wheelchairs to be exemplary teachers and role models, without having to expend additional time and energy compared with those without impairments. Recall what Cheryl said: having a PA to do the legwork '*allows for the increased time I spend doing things like book marking because of my disability*'. These teachers should not be constantly concerned that disciplinary and competence proceedings will be instituted against them, as in Clive's case. Able-bodied colleagues all need to change from within, enabling a culture of genuine support and collaboration to enhance teaching.

Top tips to teachers to take the situation forward

Cheryl suggests that teachers must '*know your entitlement, realise that you are doing a job and the school are not doing you a favour by keeping you around, challenge negative attitudes in a supportive way, and make sure you get what you need*'. Does this comment suggest that the lack of attention from the school to addressing the legal requirements of the teacher almost enforces overt action with respect to exercising their statutory rights to fair treatment? Is it this point of departure that raises eyebrows in the school and where a mindset change needs to be introduced?

BOX 3 The background and rationale of science-specific barriers and some solutions

Situation, background and rationale	Considerations and solutions
Health and Safety (H&S) What Risk Assessments (RA) have been undertaken by the head of science, maybe in conjunction with the school's nominated H&S officer(s)?	What issues have been raised through the exercise? What decisions have been taken, prior to the arrival of the teacher, to rectify the situation? Has the teacher been party to these discussions and decisions? The school's leadership has a duty of care to all its employees.
Layout of the teaching room/laboratory Are the benches fixed in position? Can the teacher move around with ease during lessons in order to reach each pupil? Does the layout of the room compromise H&S during lessons, in particular practical sessions? Recall that this was the issue about which Clive's SLT was concerned. Martyna's lab was a wheelchair-friendly teaching space. It was a combination of a tabled-area around which she could circulate in her wheelchair and work with pupils on a one-to-one basis, and a series of lab benches perpendicular to the windows-side of the room. Pupils were not distracted by sinks, gas taps and power sockets, or the view outside, so were better able to focus on learning.	Another solution, *if* the teacher cannot access all pupils or see all pupils or practical work, would be to install one or more large convex mirror(s) on the wall to ensure a safe climate for learning (engagement and behaviour for learning) is enabled in the teaching room by the teacher having a full view of the teaching space. When the pupils were engaged with practical work, Martyna could move from bench to bench and check on practical skills, H&S, etc. The fume cupboard was positioned at the far end of the teaching room and there was sufficient space for the pupils to gather round to observe a chemistry demonstration (undertaken by a technician).
Demonstrations Teachers find it difficult to demonstrate (chemistry) experiments to a class, for example, if the fume cupboard is needed. Classroom management becomes more difficult during demonstrations. Can the teacher access the fume cupboard and position herself so that all learners can see?	Maybe the chief, or an experienced, technician could do the demonstrations as a team-teaching activity, with the teacher providing the science knowledge background to the class. A visualiser could be used, or a phone or tablet app as a visualiser, or a demonstration could be videoed and recorded on a tablet and the demonstration screened onto the interactive whiteboard (IWB), thus ensuring that all learners can see what is happening in the experiment. The teacher can then explain step by step with a replay of the video to benefit the learning and to ensure that the demonstration has led to secure knowledge being gained.

BOX 3 (*continued*)

Situation, background and rationale	Considerations and solutions
Access to resources Does the teacher have access to the department's resources, such as hard copies of the schemes of work, templates, textbooks, CLEAPSS *Hazcards*?	Reposition these resources where the teacher can access them safely and with ease.
Access to the science technicians' office and store cupboards/prep-rooms Some offices have doors too narrow to permit the passage of a standard wheelchair. Sometimes the shelving units in the prep-room are close together, preventing the teacher from getting into this space safely, with ease, or at all. It is vital that all teachers explore the science stores in order to ascertain what chemicals and equipment are immediately available.	While this issue could require building-intervention (to replace doors and position shelving units further apart), this matter should be discussed and solutions reached between the teacher, the technician and other members of the science department.
Blocked and litter-filled sinks These are seen by some to be a slight bone of contention. Comments have been raised that the sinks in the labs of many able-bodied teachers are filled with rubbish, which obfuscates this issue as presenting a barrier to science teachers in wheelchairs. If able-bodied science teachers choose to ignore rubbish in the sinks in their teaching labs, any adverse consequences could be said to be the concomitant outcome of their choice. Learners know when teachers are sloppy and play to that trait. Some learners are known to delight in subverting learning by creating a flood through blocking a sink in the lab. The teacher is almost powerless to deal with such a situation.	Could technicians (and/or the school's cleaning team) be given the responsibility to undertake regular checks of the sinks and clear them out, thus reducing the potential for pupils to intentionally block sinks and cause mayhem in a lesson? Cheryl underpins this view with the following comment: '*The student sinks are not suitable for me. As I cannot see into the bottom of them it poses a safety risk as students leave things in them that I cannot see. Technician support remedies this*.'

Vanessa's advice when first asked about supporting science teachers in wheelchairs started with '*Help … ! I think the most important thing to be aware of is that there are organisations that support you in the workplace. Each disability is unique and this makes it difficult to create a one-size-fits-all approach. However RADAR, Scope, Shaw Trust and the disability employment adviser at the local job centre are all invaluable*.' Advice from occupational therapists tends to address ergonomic aspects but miss the practical aspects of a working science lab that really do present critical science-specific issues related, in particular, to health and safety. Vanessa specifically said: '*Insist on a technical adviser to come and assess, not an occupational therapist. In my experience an OT is mostly knowledgeable about everyday disability issues like working at a desk or getting to the toilet and that sort of area and you need very much more input than this to work in a lab*.' Critical logistical planning would appear to be the order of the day when it comes to making the reasonable adjustments that are fit for purpose.

Taking on board the shared experiences from the science colleagues in wheelchairs, it is strongly suggested that teachers new to a school should be encouraged to spend 2–3 days in the school in the term prior to taking up the post. The underpinning rationale is for the new teacher to experience their new working environment and bring to the attention of their line managers what (currently) will not work for them. Visiting other schools might provide the teacher with a range of ideas that can be proffered as solutions. As Vanessa says, '*The main difficulty is that you cannot access your needs until you know where you are going to be based*.' It is thus vital that the employing school invites the new teacher to spend time in the school working towards putting reasonable physical adjustments in place prior to the start of the teaching term.

Concluding thoughts

The ideas presented in this article have been generously shared by Cheryl, Vanessa, Martyna and Clive who are wheelchair-using teachers of science, in response to a request for a 'wish list' to enable Lyn to better support Martyna. Chris and Maria have worked with science teachers who are wheelchair-bound and thus provided additional invaluable guidance. Without these six people's reflections there would be no platform from which to think about ways to develop support systems for tutors, mentors, coaches, line managers and so on, to guide trainee and experienced teachers. The plan is that a working group will move on to cater for teachers across all disciplines in wheelchairs and then those with other disabilities.

The rational point of departure for exploring ways in which to make and implement reasonable adjustments and better supporting mechanisms is encapsulated in Vanessa's statement:

Each disability is unique and this makes it difficult to create a one-size-fits-all approach.

To take this important work forward, a working party has been brought together at Association for Science Education conferences to engage with the information provided and presented in this article to produce guidance documentation. The aim of the intended guidance will be to support trainers and leaders in training and teaching institutions. The resultant framework should reduce the gap (or is it a chasm?) in the support currently provided for disabled teachers and trainee teachers, initially for those science teachers who are wheelchair users.

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Further reading

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Lyn Haynes is a senior lecturer at Canterbury Christ Church University where she is a professional and science tutor on three PGCE programmes. Email: lyn.haynes@canterbury.ac.uk

Maria Turkenburg is a researcher at the University of York and a teacher support worker at York High School. Email: maria.turkenburg@york.ac.uk