Using iPads for the social communication and emotional regulation of autistic pupils: an exploration of key stakeholders' perspectives and practices

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Little research has focused on the implementation of iPad practices in real contexts and the identification of relevant challenges and enablers. This work explored practices relating to using iPads for autistic pupils' social communication (SC) and emotional regulation (ER) based on key stakeholders' perspectives. It employed two case studies undertaken in two primary schools located in the United Kingdom's West Midlands. The data were gathered by interviewing practitioners and parents and analyzing the schools' computing policies. The outcomes varied from iPads being used as multimodal learning tools, to teachers focusing on SC and ER, and parents mainly on recreation and ER. The findings were evaluated using Abbott's concept of e-inclusion (2007), considering the impact of the relationship between technology, individuals and context on iPad use in situ. Issues are highlighted around pedagogy and teaching methods, offering insights into what drives teachers to make decisions regarding technology use.

Key words: autism, social communication, emotional regulation, iPads, e-inclusion

Introduction

Since iPads were initially launched in 2010, the adoption of mobile devices in special schools to teach pupils with various needs and abilities has expanded. The interest in iPads' potential for people with autism is based on the recognition that such users show an affinity with computers (Tornblad et al., 2019). Therefore, attempts at providing evidence for improving outcomes for students with autism using touch-screen devices have included academic, behavioral and social communication (SC) skills (Larwin & Aspiranti, 2019).

A large body of research has investigated using iPads to develop people with autism's social and communication skills (Alhajeri et al., 2017; Fletcher-Watson et al., 2016; Yavich & Davidovich, 2019). Researchers have suggested that mobile devices may provide positive results as augmentative and alternative communication devices (Ganz et al., 2017; Lorah et al., 2015) or speech-generating devices, offering recommendations about their use as viable communication tools (Alhajeri et al., 2017; Lorah et al., 2015; Wendt et al., 2019). Specifically, research on tablet-based strategies has focused on engagement (Correia & Halabi, 2021), joint attention (Mangafa, 2017) or ways of promoting the social skills of individuals with autism (Schwartz, 2021).

Interestingly, although research-based evidence has shown that iPads have the potential to improve social skills, the findings have not been conclusive. This is because there has been no empirical evidence of their effectiveness in school settings beyond the results generated from experimental studies or individual cases (Begum et al., 2016; Yavich & Davidovich, 2019). In addition, researchers have suggested that previous studies have focused on the effectiveness of specific technologies (Bakola et al., 2019; Ebert, 2018), providing outdated recommendations due to the fast pace of technological advancement (UNCTAD, 2019).

Another developmental area that has not been extensively investigated is emotional regulation (ER). Research in this field requires further studies (Kouroupa et al., 2022) as only a few researchers have focused on ER (Torrado et al., 2017). Similarly, studies connecting ER to behavior issues in young individuals with autism have been limited (Berkovits et al., 2017), with most technology interventions focusing on 'fixing' challenging behaviors and teaching social skills through repetition or modeling (Burton et al., 2013). Studies on mobile learning applications and ER have also omitted environmental elements, such as the impact of cultural background and context on the development of children with autism's socio-emotional skills (Ahmad & Shahid, 2015).

Examining the research has uncovered the need to shift attention from the use of iPads as intervention tools to the practices implemented by professionals in real-world contexts and to identifying relevant challenges and enablers (Tondeur et al., 2017). Considering that technology affects not only the individuals who use it but also their parents, teachers, support workers and friends (Chandler, 2016), iPad studies should include input from key stakeholders (Fletcher-Watson et al., 2016), explore the role of context (Tondeur et al., 2017) and the readiness of educators/parents to use touch-screen devices (Christensen & Knezek, 2017).

Based on these points, the research objectives have been to:

- capture and analyze practitioners' and parents' perspectives about the practices relating to using iPads for SC and ER at school and home;
- evaluate the impact of context on how iPads are used in the classroom;
- investigate and assess the various levels at which participants, iPads and context interact and the way they influence classroom practices.

This work adopted Abbott's concept of e-inclusion (2007) to investigate the researched phenomenon and illustrate how the interaction between iPads, key stakeholders (educators, parents) and contexts (schools, home) looks in practice. Abbott (2007) describes e-inclusion as the application of digital technologies to remove or minimize learning difficulties in educational contexts. He focuses on the interaction between context, individuals and digital technologies and considers this interplay critical for effective e-inclusive practices.

Methods
Design
This study used a qualitative research design that involved two case studies. Two primary schools (Schools A and B), located in the United Kingdom's West Midlands, were purposively selected to explore the impact different educational contexts may have on iPad practices used to develop SC and ER in pupils with autism. Data were gathered through interviews with key stakeholders (practitioners and parents) and a document analysis of computing and e-safety policies.

School A, a special school for cognition and learning, supported 152 boys and girls aged between five and 11 years with mixed special educational abilities. It was well-equipped with technology, specialized in using iPads and implemented a curriculum that supported technology-enhanced learning. The school provided iPad training to both children and teaching professionals and had developed a computing policy based on its needs.

School B was an academy primary school that supported 250 children between the ages of five and 11. It had a resource base with four classes for children diagnosed with autism and developmental language disorder. Each resource base class supported six to 12 pupils, who visited the mainstream school for a few hours every week. School B was equipped with only 36 iPads and did not provide technology-related training to teachers. iPads were not frequently embedded in learning but were mainly used in the classroom for recreational purposes or to calm pupils down. Finally, the school did not have a computing policy and adopted the trust's e-safety policy to meet any technology-related issues.

Participants

Participants in both schools were selected purposively, following a nonprobability strategy (Robson, 2011) to attract a divergent sample. Educators needed to (a) have experience teaching pupils with autism and (b) use iPads in the classroom. Similarly, parents/carers needed to have (a) children diagnosed with autism and (b) personal iPads at home that were used with their children with autism.

As part of the recruitment process, all participants received a letter detailing the study. After two months, ten educators and three parents/carers of children with autism from School A agreed to participate in the study (Table 1). Participants from School B comprised five educators and four parents/carers of pupils with autism (Table 2). Despite the different number of participants from each school, the case studies provided valuable information about how iPads were used in practice for SC and ER, as the study was not comparative and did not try to generalize the findings.

Data analysis

The data were analyzed with NVivo 11 software. The dataset in each school was separately approached, adapting Braun and Clarke's (2006) thematic analysis phases: (1) data familiarization, (2) initial code generation, (3) theme searching, (4) theme reviewing, (5) theme synthesis and summary and (6) report production. Next, based on Abbott's concept of e-inclusion (2007), the themes that emerged from the analysis were categorized under three broad groups of iPad–individual–context to provide insights about their interplay. Thus, information was captured about how participants, iPads and context interacted in each school, and relevant similarities or differences were identified. Overall, the analysis yielded insights about (a) the role of iPads in each setting and practices implemented, (b) individuals' perspectives regarding iPad use for SC and ER and (c) the characteristics and impact of each context on iPad practices.

Table 1: School A participants

Demographic characteristics		
Practitioners		
Pseudonym	Role	Age group of students
TA1	Teacher	Years 5 and 6
TA2	Teacher	Reception and Year 1
TA3	Teacher	Years 5 and 6
TA4	Teacher	Year 5
TA5	Newly qualified teacher	Years 1–2
TA6	Teacher & assistant SENCo	Year 2
TA7	Teacher & quality standards and performance officer	Year 5
TA8	Teacher & educational technology coordinator	Year 5
TA9	Teaching assistant	Year 1
TA10	Speech and language therapist	Years 1–6

Parents		
Pseudonym	Relationship to the child	Family Members
PA1	Adoptive parent	2 Parents & 3 children
PA2	Parent	2 Parents & 2 children
PA3	Carers (2)	2 Carers & 1 child
C4	Under the process of autism diagnosis, social interaction difficulties, challenging behavior, foetal alcohol syndrome	Girl/8 years old

Results

IPad practices for SC and ER
School

Disparities were identified in the conditions under which iPads were utilized for SC and ER in the two schools. Educators in School A reported using iPads across the curriculum as additional learning tools and focusing on more than one skill. Teachers mentioned employing child-centred, collaborative pedagogies to support the learning process:

> 'We usually do not follow strict guidelines. Some apps will be free flow. The children choose what they want to do because they are learning through their involvement.' (TA2)

Table 2: School B participants

Demographic characteristics		
Practitioners		
Pseudonym	**Role**	**Age group of students**
TB1	Teacher	Reception–Year 1
TB2	Teacher	Year 4
TB3	Teacher	Years 5–6 (Key Stage 2)
TB4	Lead ICT Technician	Years 1–6
TB5	Teaching assistant	Year 4
Parents		
Pseudonym	**Relationship to the child**	**Family Members**
PB1	Parent	2 Parents & 3 children
PB2	Parent	2 Parents & 2 children
PB3	Parent	2 Parents & 6 children
PB4	Parent	2 Carers & 1 child

Participants referred to using iPads for communication, engagement and the socialization of children with autism, affirming previous research on the value of technology in supporting SC skills (Alhajeri et al., 2017; Ebert, 2018). Examples of embedding tablets into the curriculum involved the video and audio recording of science experiments, learning to communicate via e-mail or symbols, consolidating pupils' understanding of the lesson, and encouraging group task discussions. Regarding ER, educators mentioned focusing on children's independent use of iPads for relaxation and regulation of challenging behavior, showing ambiguity in what this developmental area involved.

In contrast, the use of tablets was not part of teachers' everyday practice in School B. As it was reported, the frequency of iPad use depended on (a) children's behavior, (b) devices' availability and (c) practitioners' confidence in using tablets. Educators in School B stated that iPads were mainly used for recreational purposes, with only one participant reporting embedding tablets into the curriculum to enhance pupils' learning:

> 'We currently use the iPads mainly to reinforce the learning that has happened in the class previously … We bring iPads in after the main

teaching has been delivered, and we use them to reinforce, discover and find out what the students have learnt.' (TB3)

IPads were also used in School B to reward pupils, record their progress and calm them down. Relaxation and regulation of challenging behavior were among their highest priorities with educators stating:

'If the child opts out of work, we would say…"work first and then have the iPads", so we would use it as a motivator.' (TB2)

Overall, the findings showed that educators' iPad practices for SC and ER varied depending on the context where they were applied and educators' familiarity with the technology.

Home
According to the findings, the children's use of iPads at home mainly focused on recreation with the preferred activities including watching YouTube videos, playing games and communicating online with friends and family. As one parent mentioned:

'There is so much stuff for him to explore on the iPad. He loves pirates, so he watches a lot of pirate things on YouTube. Alternatively, videos related to fish, as he loves the sea and the sea animals.' (PB2)

Children accessed the devices daily, with all parents following a structured routine to regulate their use. They also reported implementing child-centred approaches based on children's interests and needs:

'*My child is so controlling as to what apps are on her iPad. She likes watching clips about how the world works. She likes to watch videos of real people when they are doing activities like playing games.*' (PA1)

Parents reported prioritizing the development of their children's ER with iPads, approaching the devices as calming tools to reduce anxiety levels and challenging behavior. Still, SC was also among the preferred target skills, with most parents highlighting tablets' positive impact on developing the pupils' communication skills. For example:

> 'The iPad has helped her a lot because applications that she plays on the iPad and videos that she watches on YouTube help her with her talking and communication. She has improved a lot because, at one stage, she would hardly talk at all.'   (PA2)

Interestingly, although parents seemed to also be interested in software that facilitated communication and felt optimistic about the positive impact of tablets on pupils' SC skills, they mostly used iPads as assistive tools to regulate their children's emotions, reduce distress, anxiety or challenging behaviors.

Individuals' perspectives: the role of confidence
Practitioners from School A favored the positive impact of iPads on pupils' independence and transfer of knowledge, showing an overall positive attitude towards the devices. This was also echoed by educators in School B despite their lack of confidence in using iPads for educational purposes. For example, one teacher from School B stated:

> 'The children who struggle to write have been much more focused and enjoyed that level of independence with the iPads. I think iPads can build up their confidence by working on them [sic].'   (TB2)

Educators from both schools believed that confidence impacted their lesson productivity with technology, making a connection between confidence and training. For example, one teacher from School A stated that training and confidence affected educators' iPad practices, shifting the attention from using tablets as rewards to additional learning tools:

> 'When we first bought the iPads, we had 12 classes and only three were using iPads effectively. Most of the other classes were using them as a reward. But then we had lots of training every week after school to learn how to use certain apps and then everybody became more and more confident.'   (TA7)

Practitioners in School B emphasized the same view by referring to the positive effect that regular training could have on their confidence with iPads. The educators who asked researchers to train them on how to use iPads for SC and ER mentioned that training on specific subject areas combined with in-class tutoring benefited their practices. For example:

> 'You [the researchers] coming here and just bringing all these new iPad ideas is just amazing because I could see them last week, they were so engaged and they loved working on iPads … if you could come more often and stay with us, to teach us how to use iPads with the kids that would be amazing.' (TB1)

Overall, the findings shed light on the role of appropriate systemic support, such as training, on educators' perspectives of iPad use for SC and ER and the successful integration of technology with learning.

Contextual influences
The educational technology co-ordinator
The impact of the educational technology co-ordinator (ETC) in developing teachers' confidence and good practices for SC and ER was evident in School A. The ETC appeared to be central in creating technology-oriented communities of practice within and outside the school context, encouraging co-operation and knowledge-sharing between practitioners, researchers and other technology experts. For example, one teacher mentioned:

> 'We work collaboratively between us [teachers] and we have the ETC who gives us training … He shows us new apps that are coming out and different ways of using the iPads in the classroom. Collaboration is important … it is a big thing about being able to share the knowledge with other teachers.' (TA2)

The findings from School B showed that although the information and communications technology (ICT) lead supported teachers' lessons with technology and provided technical support, they were not specialized in iPad software for individuals with autism:

> 'I am a technician, but I do support lessons. So, if a teacher wants to do a lesson using an app and they would like the support, I can help. They can request me, and I am more than happy to go to the class and help. However, I have not done much work with iPads and kids with autism.' (TB4)

Therefore, educators did not receive any training, which had a negative impact on their confidence in using iPads in the classroom.

In sum, the study revealed the significant influence of ETC expertise on educators' confidence in using iPads, plus the important role of specialized training and technology support networks in successfully integrating technology for SC and ER.

Computing policy and technological infrastructure
School A's computing policy had an impact on the way iPads were integrated into learning as it offered teachers clear guidelines about technology's role in teaching:

> 'Teachers are encouraged to use the iPads to assist with children's learning. If additional apps are required, the teachers are expected to ask the computing co-ordinator to purchase and apply this app to the appropriate set of the school's iPads.'   (School A)

On the contrary, educators from School B, which did not have a computing policy but used the trust's e-safety plan to address technology use in the setting, reported that there was no clear direction on how iPads could be embedded in learning.

Moreover, the schools' technological infrastructure was also reported to influence how iPads were used in situ for SC and ER. For example, School B's technological resources did not cover educators' and pupils' needs; indeed, one of the reasons for not embedding iPads effectively into teaching related to practical difficulties, such as the limited number of devices in the resource base. One educator reported:

> 'We have got six or seven iPads [in the resource base], and we need to share. In my classroom, I have eight children. We need to share them, and that is a nightmare, especially with children of younger ages.'   (TB1)

Overall, the findings showed that contextual factors, such as technological infrastructure, availability of resources and guidance, were essential elements for successful and consistent iPad use in learning for SC and ER.

Home–school communication gap
The findings implied that a communication gap existed between educators and parents regarding iPad use for pupils with autism's SC and ER. Although

all participants recognized the importance of partnership between home and school, learning continuity was not facilitated concerning tablet practices. The use of different iPad practices between home and school was associated with both educators' and parents' busy schedules, the different uses of technology at home and school and participants' different perceptions and values of iPad use. For example, the interviews showed that educators believed iPads were not used at home as instructional tools. Therefore, they did not consider it necessary to share their knowledge and ideas with parents:

> 'As long as the parents realise that this is not a toy and a reward, but it is a tool that we use for educational purposes. It is not a child-minding device. And that is a hard thing to understand because they see it as a home device, and they cannot necessarily understand what we do in our context.' (TA8)

In sum, the findings identified that the home–school communication gap and the lack of interaction and learning continuity between educators and parents influenced the iPad practices used in each context and the prioritized developmental areas.

Discussion and implications

IPad practices for SC and ER

The study showed that educators from Schools A and B focused on different target skills and practices when using iPads for pupils with autism's SC and ER. Contrary to previous studies' inclination to approach iPads as intervention tools focusing on specific apps (Aspiranti et al., 2020; Petrov et al., 2017), teachers from School A, who were specialized in iPad use, preferred to integrate tablets across the curriculum, using specialized and flexible software to develop SC. IPads were used in academic subjects combining specific and spontaneous learning experiences to target various skills and motivate pupils to use tablets imaginatively.

Regarding ER, the findings showed a discrepancy in the approaches adopted by educators from both schools, with most educators showing ambiguity of what ER entailed. Interestingly, it was revealed that all educators used iPads to calm pupils down and control challenging behavior. Drawing lessons from previous research, which has shown technology's potential to reduce stress (Nunes et al., 2020), the study provided insights into the affective and emotional aspects of iPads in reducing the anxiety levels of students with autism.

Anxiety is one of the foremost challenges individuals with autism face and can affect their school life (James Lind Alliance, 2020); however, it was identified that iPads can be used effectively as behavior management tools and enable e-inclusion in learning. More specifically, the study demonstrated that the use of free-flow, interest-based iPad activities can reduce stress levels and challenging behavior in pupils with autism, and therefore, facilitate inclusion. This finding builds on Abbott's (2007) concept of e-inclusion and the way he defined the different uses of technology, as it suggests that iPads can also support ER.

The study also indicated that pedagogy needs to be approached as an essential element for creating the conditions for rich learning experiences with technology. In concurrence with previous research, the study showed that how educators use technology enables authentic learning experiences (Shuler et al., 2012). It is therefore suggested that student-centred, collaborative approaches are adopted and flexible iPad apps used to improve the SC and ER of pupils with autism and allow them to be more in control of their learning.

Finally, the findings also revealed that national guidelines might not guarantee successful iPad integration into learning, implying that generic technology recommendations may be less supportive than anticipated. The study highlights that the implementation of iPads across the curriculum and the use of interactive-optimized apps can increase pupils' motivation and involvement in learning, revealing the dual role of iPads as assistive tools for SC and ER and enablers of learning for pupils with autism.

Individuals' perspectives: the home–school collaboration gap
Few studies have explored the use of tablets in home settings (Neikrug & Roth, 2015); however, this study revealed disparities in the collaboration between home and school regarding iPad use for SC and ER. These differences indirectly impacted the development of pupils with autism's SC and ER and were associated with educators' and parents' various perspectives regarding technology. The lack of collaboration between parents and teachers affected how the devices were accessed by children in the two contexts and obstructed learning continuity and knowledge-sharing. In line with previous research, which recommends that technology should be studied in conjunction with the environment where it is applied (Abbott, 2007), the findings provided clear links about the strong relationship between iPad practices and context. The study also affirmed previous

research that showed that educators', parents' and children's practical experiences should be shared between contexts and not prioritized over one another (Parsons et al., 2020).

Considering that collaboration can be difficult due to educators' and parents' busy schedules, the study identified that children with autism could play an essential role in fostering communication bridges between home and school. For example, one parent suggested that asking children to inform parents about the apps that educators use at school and vice versa could bridge the iPad practices gap between the two contexts. This practice could enable the consistent use of technology and learning continuity across settings and facilitate powerful learning experiences whereby tablets act as assistive tools for SC and ER and enablers of e-inclusion.

To sum up, the identified complex relationship between iPads, individuals and context shows that technology should not be considered separately from practice. It also provided insights into the various uses for SC and ER observed in different contexts. The study confirmed Abbott's (2007) statement that technology should be examined in conjunction with reflective spaces and practices to inform teaching and learning. It also provided insights into ways to create communication bridges between home and school regarding iPad practices.

The impact of context

The study situated iPads in context and contributed to previous research, highlighting a need to better understand how broader environmental aspects can influence iPad use in situ (Tondeur et al., 2017). Considering that the role of the environment has often been omitted from technology-related studies (Rosenberg & Koehler, 2015), the findings generated meaning and recommendations from the unique lived experiences of educators and parents, revealing the impact that context may have on iPad use for SC and ER.

Using Abbott's (2007) concept of e-inclusion, the findings revealed that in both schools, (a) organizational, (b) personal and (c) technological components interacted and influenced how educators used iPads in the classroom for SC and ER. More specifically, (a) schools' systemic support, (b) collaboration between practitioners and parents and (c) training from specialized personnel informed teachers' decisions. These elements also empowered them to develop technology-related skills and achieve successful and consistent

technology use in learning. Moreover, it was shown that the impact of the educational environment in terms of policy and curriculum, and the availability of technological resources, training and collaboration affected educators' confidence in using technology in their classrooms.

The study also shed light on the indirect influences of distal contextual elements (such as school profile and culture) and their impact on the successful integration of iPads into teaching for SC and ER. For example, it was shown that schools' different visions regarding technology's potential to enhance learning impacted how Technology Enhanced Learning practices were shared among the teaching community in Schools A and B. Following previous research, which has posited that school culture is associated with technology use in the classroom (Gürfidan & Koç, 2016), this research revealed that a strong development orientation and active internal and external networking through communities of practice can enhance effective integration of devices into teaching. Hence, in line with previous research (Tondeur et al., 2017), the study showed that learning communities can be valuable in improving teachers' iPad practices.

Lastly, the findings showed links between implementing a shared leadership team and creating rich social technology-related contexts. To achieve this, schools should focus on teachers who are iPad experts' knowledge and experiences (such as the ETC) to strengthen the vision of technology's role, support staff and provide long-term technical assistance. This approach can increase educators' confidence when using technology and transform their role in the learning process from passive participants to agents of their practice. Finally, it is suggested that adequate training on using iPad should not only involve computing skills but also focus on enhancing pedagogical techniques through practice and real-life examples (Cubukcuoglu, 2013).

Limitations and directions for future research
The study implemented a detailed research design and involved various groups of participants from two schools to provide a holistic insight into key stakeholders' perspectives regarding iPad use for SC and ER. However, it should be acknowledged that the number of participants from School A did not match those from School B due to the difficulty of gaining access to the settings, specific time frame for data collection and the interviewees' busy schedules. Although this study did not intend to generalize the findings, it is suggested that future studies involve equal numbers of participants from

different contexts to lead to broader assumptions. It is also recommended that studies include the voices of individuals with autism to provide a more rounded view of the researched phenomenon.

Considering that the study highlighted the communication gap between home and school in terms of iPad use for SC and ER, future studies may explore ways of fostering collaborative partnerships between parents and teachers. Based on the study's findings, it is recommended that researchers need to examine the role of children with autism in fostering communication bridges between home and school. To achieve this, attention should be placed on how children with autism can bring together school and home iPad practices by sharing educators' and parents' knowledge and experiences.

Further research is also needed on the role of training in the successful implementation of iPads in the classroom, as the study implied a close alignment between training, pedagogical beliefs and school support. Future studies may focus on developing broad technology training programmes that could be applied in various educational settings, seeking consultation by collecting the perspectives and in-situ experiences of ETCs and special needs teachers.

Finally, it is recommended that the approach of this study is extended to other models of technology use in practice. The methodology and theoretical concept of this research may be applied to explore the use of smart objects, robots, virtual reality, tangible interfaces, or wearable technology in the classroom for pupils with autism. Engaging educators' perspectives and integrating research within real-world practices may provide valuable research about how technology and autism are situated in context.

Conclusions

This research studied practices relating to using iPads for pupils with autism's SC and ER by collecting the views of key stakeholders. Contrary to previous studies, the topic was considered from several viewpoints and contexts, emphasizing the importance of situating autism and iPads in real-world settings. This study provided insights into what drives teachers' decision making regarding technology use in situ, highlighting the importance of supporting educators to develop their technology skills. It also underlined the essential role of understanding pedagogy as a driver for successful technology integration with learning. The study explored the complex interaction between iPads, key stakeholders

and context, revealing that a combination of organizational, personal and technological components influenced how iPads were used in context. At the same time, it suggested recommendations about the contextual factors that create the conditions for successful iPad use for SC, ER and e-inclusion.

The findings also implied the existence of a communication gap between educators and parents regarding iPad use for pupils with autism's SC and ER. Hence, it determined that the relationship between educators and parents should not be taken for granted, providing new directions about the need to shift the attention in iPad research from the research–practice gap to the school–home gap, focusing on the role of children with autism as communication bridges. The study also presented useful recommendations for practice, highlighting technology's potential to support pupils' communication, collaboration, relaxation and transition through collaborative pedagogies and multimodal teaching methods. Finally, it illustrated a combined view of technology's role as an assistive tool and enabler of learning for individuals with autism, highlighting an additional dimension to its use as a regulator of ER and challenging behavior.

Conflict of interest disclosure
The authors report that there are no competing interests to declare.

Ethics approval statement
The study received full ethical approval from the Ethics Committee of the University of Birmingham for the two case studies (ERN_16-0551A and ERN_16-0551B). Permission for the case studies was also granted from the two target schools after discussing with the headteachers confidentiality issues and participation time and tasks.

Data availability statement
The data that support the findings of this PhD study (degree awarded in December 2021) are available on request from the corresponding author. The data are not publicly available due to ethical restrictions. The PhD thesis based on which this paper has been produced has been uploaded to UBIRA E-Theses repository and is available online at https://etheses.bham.ac.uk/id/eprint/12019/.

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