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Effective questioning and feedback for learners with autism in an inclusive classroom

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Abstract: There is limited research regarding how Assessment for Learning (AfL) can support mainstream classrooms that have students with special needs. In current literature, it is assumed that AfL functions in similar ways across different contexts. Studies on how AfL practices can accommodate mainstream and special educational students in the same classroom are very limited. The present study sets out to investigate AfL practices in the context of mainstream classes that include high-functioning students with autism spectrum disorder (ASD), focusing specifically on questioning techniques and teacher feedback. Though these strategies are associated with positive learning outcomes, learners with ASD may face difficulty in engaging in such questioning and feedback dialogue because of various challenges (e.g., atypical attentional networks). This qualitative instrumental case study involved observing six mainstream teachers from five schools during lessons and separately interviewing the teachers and the students with ASD. The study found that these teachers used approaches that focused on three considerations: addressing the cognitive needs of students (e.g. precise and direct questions); their socio-emotional needs (e.g. affirmative feedback); and supporting structures (e.g. visual cues). The study expands our current limited understanding of AfL in inclusive classrooms and highlights the implications for classroom practice.

ABOUT THE AUTHORS

H.Y. Tay is senior lecturer in the Curriculum, Teaching, and Learning Academic Group, NIE, focussing on classroom practices that result in engaged learning, especially through Assessment for Learning (AfL). She has presented papers and her recent works include a book on authentic assessment published by Routledge, book chapters in scholarly books and research articles in peer-reviewed journals.

K.N.N. Kee is a lecturer in the Early Childhood and Special Education Academic Group specializing in special needs education. He has board certification in special education and is a member of the Chartered College of Teaching. He has co-published peer-reviewed papers, books and academic book chapters on special education, autism, pedagogy and professional development. He is currently part of a research team looking into team-based learning and assessment for learning. This study brings together each of our expertise to inform both AfL and education for learners with autism.

H.Y. Tay

PUBLIC INTEREST STATEMENT

Learners with Autism Spectrum Disorder (ASD), even those who are high functioning in mainstream classrooms, have difficulties in engaging in questioning and feedback dialogue that teachers often use in class. This study sought to identify how effective teachers can craft questions and feedback to especially suit these children but is also beneficial to all in class. Through lesson observations and separate interviews with the teachers and students with ASD involved, we found three important considerations: addressing the cognitive needs of students (e.g. precise and direct questions); their socio-emotional needs (e.g. affirmative feedback); and supporting structures (e.g. visual cues). The study challenges us to think of the implications of a learner-centred education that aspires to support the full participation of all in class, including those with ASD.

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1. Introduction

It is common for students with (more) extreme morbidity of special needs to be accommodated in special schools to address their distinct learning needs. Students with special educational needs of lesser morbidity may attend mainstream schools, and such inclusive classrooms may present challenges for assessment and pedagogy. In particular, students on the Autism Spectrum Disorder (ASD) face difficulties in communication and social understanding, flexibility of thought and sensory processing which impact on all aspects of learning (Ravet, 2018, p.715). Such challenges are a hindrance especially in pedagogical and assessment approaches that are reliant on communication, such as questioning and feedback techniques.

There is extensive research in questioning and feedback dialogue in class. Studies have looked at how this dialogue should be conducted (Ko, Sammons, & Bakkum, 2013; MacPhail & Halbert, 2010; Murray, Ruth Gasson, & Smith, 2018; Nicol & Macfarlane-Dick, 2006) as well as how it contributes to student learning

(Boyd, 2015; Hattie & Timperley, 2007; Mohr & Mohr, 2007). However, the literature generally assumes that it functions in similar ways across different contexts. Such an assumption applies for Assessment for Learning (AfL), adopted by many teachers as "the process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there" (Assessment Reform Group, 2002). Among the high-leverage AfL strategies recommended to teachers are, first, questioning to find evidence of learning and, second, feedback to close the learning gap (Brookhart, 2017; Duckor & Holmberg, 2017; Hattie & Clarke, 2018).

However, current research does not address how AfL can be tailored to children with different needs, for example, high-functioning students with autism spectrum disorder (ASD) in mainstream classes. Of the results gleaned from online search using databases such as Educational Resources Information Centre (ERIC), none were empirical studies specifically examining questioning and feedback dialogue in an inclusive classroom setting. As such, little is known about how questioning and feedback works with students with ASD who "have a very different way of experiencing and perceiving the world compared to neurotypical learners" (Ravet, 2018, p.715).

This study aimed to address this gap by collecting data from both teachers and high-functioning students with ASD in mainstream classes. The findings will inform current teacher practice and teacher training for inclusive classrooms. The study will expand our current limited understanding of AfL in relation to autism.

2. Background

There has been a movement in many countries to promote inclusive classrooms where children with special education needs (SEN) attend mainstream lessons (UNESCO, 2005). In Singapore, for example, those with mild disabilities, deemed able to possess the cognitive ability to benefit from the national curriculum, are now enrolled in mainstream schools. They totalled 18,000 in 2016, or approximately 4 per cent of the total school population, an increase from 13,000 in 2013 (Lim, 2016). However, enrolment is just the first step. The schools must be equipped to respond to this increased diversity of learners. Unfortunately, in some cases, teachers in inclusive classes have reported stress in attending to the needs of SEN children, as well as grappling with large class sizes, a packed syllabus and high-stakes national examinations (Poon, Wong, Kaur, Khaw, & Ng,

2011; Yeo, Neihart, Chong, & Huan, 2010). To support schools, the Singaporean Ministry of Education has introduced the training of teachers in general awareness of the needs of SEN students, as well as classroom strategies to support specific areas such as ASD. However, there is no specific professional development about the use of Assessment for Learning (AfL) for such classes.

3. Literature review
This section begins with a review of literature on the challenges faced by ASD students in classroom pedagogies, in particular questioning and feedback. The importance of AfL strategies on the use of questioning and feedback dialogue in facilitating learning in a typical lesson is presented. It is argued that such approaches may not adequately cater to ASD students, and changes to the paradigm and practice of AfL approaches need to be reconsidered to be efficacious and inclusive for such special learners.

4. Difficulties faced by ASD students in engaging in questioning and feedback dialogue
There are extensive research studies that report the challenges faced by students with ASD in the classroom. In 2013, Keehn, Muller and Townsend reviewed the extant research on attention in ASD and found support for the idea that people with ASD have atypical attentional networks. The atypical attentional networks may stem from atypical accelerated brain growth of approximately 10 per cent in both head circumference and brain weight from birth to the first two years (Courchesne et al., 2007; Engeland & Buitelaar, 2008). The frontal, temporal, parietal, occipital and amygdala brain regions have been reported to develop significantly more than is typical.

These brain matter increases can help account for the significant differences in terms of sensory processing between children with ASD and typically developing students (Lane, Young, Baker, & Angley, 2010; Tomchek & Dunn, 2007). Both studies reported that more than 90 per cent of the participants with autism had auditory filtering challenges. In the study by Greenspan and Weider (1997), 100 per cent of the participants demonstrated difficulty in auditory responding. As a result, students with autism may find it challenging to have sustained attention on the teacher during the questioning and feedback dialogue.

People with autism have a natural processing bias towards using their superior detail-focused cognitive style, they also have weak central coherence and are challenged when trying to see the "big picture" (Happe & Frith, 2006; Rajendran & Mitchell, 2007). The challenge to see the "big picture" is not because they are unable to do so; rather, it is probably due to the natural limited attention resources whereby one stimulus "hijacks" the bulk of the attention resources, with little left to consider other types of stimulus. Moreover, as people with ASD do not normally observe people during communication, they do not learn the non-verbal communication that provides cues and information about how others may perceive the same situation, leading to the theory on mind hypothesis of people with autism that proposes "mind-blindness" (Engeland & Buitelaar, 2008) or difficulty reading the intentions of others. The severe problems faced by people with autism regarding the pragmatic aspects of language due to weak central coherence can be seen by inappropriate turn-taking in conversation, the inability to adjust to communicative settings (e.g. impoliteness, embarrassing questions, pedantic speech), and difficulties understanding non-literal language such as irony, metaphor, humour and language in context (Pijnacker, Hagoort, Buitelaar, Teunisse, & Geurts, 2009). As a result, learners with ASD may find it harder to clue in on the subtle hints or prompts that teachers sometimes use in questions and feedback. Their inability to engage in such dialogue in class can result in them struggling to keep pace with their classmates in a mainstream classroom and consequently, lower student outcomes (Guo, Connor, Tompkins, & Morrison, 2011; Yeo et al., 2010).

Given their atypical neurodevelopment, and problems understanding and responding to teacher talk, it cannot be assumed that pedagogies that do not cater specifically to the specific needs of students with ASD will support their learning. Neither can it be assumed that modified questioning

strategies specifically constructed for students with ASD will work just as well for mainstream students. Hence, it would be useful to examine if classroom assessment strategies, such as questioning and feedback, are fit for purpose in inclusive classrooms. One such context to examine attempts to use AfL more inclusively is the Singapore educational system which has emphasized AfL and affordances for SEN students in recent years.

5. The importance of AfL, especially questioning and feedback

As in many other countries, one key educational priority in Singapore schools is Assessment for Learning (AfL), defined by the Ministry of Education (MOE) as "assessment that supports teaching and learning with the specific use of learner-centred approaches and strategies" (MOE-OPAL, 2016). Professional development for teachers in AfL has been ongoing, especially for schools taking part in an *Assessment Literacy* journey, with support from the Ministry, to enhance their teachers' assessment literacy. Yet, it is only recently that a large-scale study was conducted by Deneen et al. (2019) to document AfL as it is practised in secondary schools. The findings from surveying teachers and school administrators from 13 secondary schools suggest that, while participants valued AfL, they did not report as much proficiency or practice in it, particularly in areas that involved students (e.g. self- or peer assessment). A follow-up case study by the same researchers involving classroom observations and interviews found that the most prevalent AfL strategies were quick "dipstick" checks, usually through teacher questions during lessons and consequent class-level feedback (Tay & Lam, 2017).

Such classroom dialogue through teacher questioning and feedback is an important area that can contribute to positive effects in student learning. Studies suggest that effective classroom questioning can help bring about positive student outcomes (Boyd, 2015; Mohr & Mohr, 2007). According to Hattie's meta-study, the effect size for questioning is 0.41, slightly above his threshold effect size of 0.4 (Hattie, 2015). The literature also suggests that, in order to reap greater benefits, teachers should ask open-ended questions (MacPhail & Halbert, 2010), give more waiting time (Ko et al., 2013) and create a student-friendly and non-threatening classroom environment where students feel safe to make mistakes when answering questions (Kirton, Hallam, Peffers, Robertson, & Stobart, 2007).

More effective than the questioning technique is providing formative evaluation and feedback, effect sizes being respectively 0.68 and 0.73 (Hattie, 2015). Much has been written about effective feedback practices (Brookhart, 2017; Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). Earlier literature framed feedback almost as one-directional "information provided by an agent (e.g., as information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding" (Hattie & Timperley, 2007, p. 81). The current notion frames feedback as a dialogue between teacher and student (Nicol, 2010) focusing on suggestions for improvement (Heritage, 2008). Such dialogical feedback can be presented through posing a question as the learner is prompted to think more deeply about his performance (Murray et al., 2018). For the purposes of this study, questioning and teachers is viewed conjunctively as part of the verbal interaction, where the teacher seeks to determine student learning and uses feedback to close any learning gaps.

In short, the research so far suggests that questioning and feedback dialogue can enhance student learning. As yet we do not have empirical evidence of their effect on learners with ASD. In fact, a search on EBSCo and ERIC research database using the relevant key words "questioning", "feedback", "autism", "ASD" and combining them using the Boolean search operator "AND" turned up few journal articles, none of which were empirical studies in an inclusive classroom.

6. The gap: understanding AfL in inclusive classrooms

Given the challenges described earlier, how can a mainstream classroom teacher enact AfL in a way that is effective for SEN learners as well as their classmates? The European Agency for Special Needs and Inclusive Education (EASNIE) (2015) describes AfL as a "qualitative" type of

assessment procedure that informs teachers about students' learning through collecting evidence (using tools such as observations and questioning) to guide the next steps in learning (for example, through feedback).

There seems to be agreement that what is good for SEN students is good for all students (Meijer, 2003) and that, conversely, general AfL methods can be used with SEN provided that they are modified and adjusted to meet their needs (EASNIE, 2015). For example, it is suggested that teachers should give a longer wait time to SEN children after asking verbal questions. These questions can be supported with different stimuli (e.g. visual) and different ways of responding, for example, without eye contact (European Agency for Special Needs and Inclusive Education, 2015). With ASD children, in particular, it has been suggested that teachers should use only brief and clear questions, avoiding idioms and metaphorical questions (Florian & Black-Hawkins, 2011). Similarly, feedback should be kept short and unambiguous, with the next steps made explicit and supported with concrete, visual representation, for example, via mind-maps (Ravet, 2013).

Some studies have been conducted on how people with high-functioning ASD respond to questions in the context of police interviews. Two studies suggest that people with ASD are more compliant, perhaps to avoid conflict and confrontation (Kuusikko, Pollock-Wurman, Jussila, Carter, & Mattila, 2008; North, Russell, & Gudjonsson, 2008), and likely to agree with suggestions (The National Autistic Society, 2017). In contrast, another study found that individuals with ASD were no more compliant than the control group (Maras & Bowler, 2012). Perhaps the different responses are a result of how threatened the interviewee feels in the presence of the authority figure (Freckelton & List, 2009). As such, advice issued for police interviewing potential suspects or witnesses with ASD includes using a quiet, non-threatening voice and simple language and allowing for a delayed response (Allely, 2015; The National Autistic Society, 2017).

The efficacy of such accommodations in questioning and feedback dialogue has yet to be verified empirically in a mainstream classroom. Some may even argue that efficacy is hard to establish when there is a large range of ASD abilities and characteristics, and that there is no "typical autism template" (Karten, 2017, p.75). Nonetheless, without a better understanding of how autism learning can be facilitated by questioning and feedback, teachers are not able to make sound inferences about where the learners are, and how to best to give formative feedback, two key considerations that underpin AfL. Apart from the contributions to practice, the findings of this study aim to extend our current limited understanding of what Ravet terms "the necessary inter-relationship between inclusion for all … and authentic formative assessment" (2013, pp.961–2).

7. Research question

The present research sought to address the identified gap in the extant AfL literature by asking the research question: What characterizes effective questioning and teacher feedback in an inclusive classroom with students with ASD? Specifically:

• What types of questions and feedback do teachers use?
• What considerations should teachers keep in mind in using questioning and feedback?
• What do students with ASD consider to be effective questioning and teacher feedback?

8. Method

8.1. Research design

Given the complexity of each ASD child's ability and disposition, this study adopted an instrumental case-study approach, with each case comprising a student–teacher pair: a child with ASD in a mainstream class and a corresponding teacher. Each case was investigated in-depth, taking into consideration the context of the child's specific profile and the teacher's practice. At the same time, to gain a better understanding of the phenomenon of interest (questioning techniques and

teacher feedback in class), the cases were compared for meaningful relations among them in terms of any commonalities (Stake, 2006). This qualitative method allows us to explore the perspectives and experiences of participants and gain a deeper understanding of the questioning and feedback dialogue in the context they occur (Bölte, 2014; Humphrey & Lewis, 2008).

Once the teacher and student participants had been identified, the researchers visited the school to brief the teacher participant on the study and to seek written consent. (See Table 1 for sequence). Where possible, the researchers met with the student for an informal chat. Written consent was sought and given by the parents of students who were underage. They were also informed of the study and how their child would be involved.

8.2. Participants
The student–teacher pairs came from two primary and three secondary schools (see Table 2). Initially, schools were asked to choose teacher participants from among their pool of teachers trained in special needs (TSN), who have undergone a certificate in special needs support after attending one foundational module (Engaging Students with Special Needs in Mainstream Classrooms) and an elective course on Autism Spectrum Disorders: Characteristics and Classroom Intervention. When that was not possible, the schools nominated teachers considered to be effective in inclusive classrooms who were currently teaching classes that included students with ASD. Such purposeful sampling of trained, experienced teachers who are effective with children with ASD was intended to gather rich data on efficacious practices that would not be available in less favourable conditions (Stake, 2003). The study also sought to ensure a range of subject areas (e.g. English Language, Science, Maths) because it is conceivable that questioning and feedback will look different in different subject areas.

8.3. Data collection
The study collected data from the following sources:

(1) Observation of two lessons (each lasting 30–60 mins) taught by the teacher participant in the selected class with a student with ASD;

(2) Post-observation interview with the teacher participant;

(3) Post-observation interview with the student participant.

To minimize the distraction posed by the researcher's presence in the classroom, he sat at the back of the class outside the view of the student participant. Also, the lessons were videotaped using a relatively unobtrusive gadget (iPhone mounted on Swivl stand). One school (School A) offered the use of its teaching lab, where lesson observations are often conducted, here the student and teacher participants could be observed from behind a glass panel and the lesson could be videotaped from an unobtrusive camera mounted on the ceiling. In addition to the video

Table 1. Timeline of fieldwork	
Sequence of events	**Action**
1. Identification of participants	Email invitation to school principals regarding study Identify suitable teacher and student participants
2. Briefing of participants	Meet participants in school Get written consent for study from participants Arrange dates for lesson observation and interviews
3. Lesson observations	Video-tape two lessons, with researcher seated at the back of class (writing field notes)
4. Post-observation interview	Interview teacher and student (separately) within one week of last lesson observed (if possible). Interview of student in presence of another more familiar staff member (if neccesary)

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Table 2. Composition of participants			
Case	Level/Subject	Teacher	Student
A	Pri. English Language	Female (TSN)	Male (10 years old)
B	Pri. Maths	Female (Not TSN)	Male (10 years old)
C	Sec. Maths	Female (TSN)	Male (14 years old)
D	Sec. Maths	Female (Not TSN)	Female (14 years old)
E	Sec. English Language	Male (TSN)	Male (14 years old)
F	Sec. Science	Female (TSN)	Male (13 years old)

recording, data included the researchers' field notes of the types and manner of question and feedback dialogue between the teacher and the student with ASD.

The semi-structured interview schedule for the teacher started with questions related to the teacher's experience and perceptions. Examples included "How do you feel about having (name of child with ASD) in your class?" and "Who/What has helped in preparing you to teach in such classes?" Questions also investigated the teacher's AfL practice, for example, "What are the questioning and feedback strategies that you feel have helped (name of ASD child)? How do you know that they were helpful?" Probed specific episodes of questioning and feedback were also observed during the lesson. (See Appendix A for the complete list of questions.)

Similarly, the semi-structured interview schedule for the student participants probed their experiences and perceptions of the lessons observed. The interviews start with casual talk about school to create a friendly mood to help the student participant feel at ease before they were asked general questions on what they considered to be helpful during lessons. The next section focused on specific things that happened during the observed lesson to probe how they felt about specific questions or feedback noted by the researcher. The researcher would then try to generalize from their response before doing a member check with the participants. (See Appendix B for the complete list of questions.) In the case of the two younger student participants (Case A and B), the interview was conducted by, or in the presence of, the allied educator, a staff member trained to provide learning and behavioural support to SEN students in the school.

8.4. Ethics protocol
The study complied with the ethical protocols set by Nanyang Technological University and the Ministry of Education. The principals of participating schools, teachers and parents of students chosen for the study were briefed through an information sheet. Consent, anonymity, confidentiality and the right to withdraw were explicitly addressed.

8.5. Data analysis
The interviews, typically lasting an hour each, were audio-recorded with the participants' consent and then transcribed verbatim. The anonymized interview data, and the lesson observation data, were analysed and coded by the two researchers separately before discussions. Following Braun and Clarke (2006) six-phase framework for thematic analysis, the researchers familiarized themselves with the data (field notes, interview and lesson video transcripts) before generating initial codes that answered the research questions. These codes were examined to understand better what marked these questioning and feedback practices as effective in order to arrive at tentative themes (see extract in Appendix C). A theme is defined as "a pattern that captures something significant or interesting about the data and/or research question" (Maguire & Delahunt, 2017, p.3356).

These themes were constantly reviewed. For example, we had initially attempted to synthesize the codes using Bigg and Collis' taxonomy (1982) for the questions and Hattie and Timperley's

levels for feedback (2007). This was abandoned in favour of themes that could apply across questions and feedback. In addition, we also looked for themes that could apply equally to both lesson observations and interview data to arrive at coherent and distinct ones that answered the main research question. The final three themes are presented in the following section.

9. Results

Despite the different contexts of the six teacher–student pairs, some commonalities emerged regarding what characterizes effective questioning and feedback practices. It was apparent that teachers made accommodations taking into consideration the ASD students' idiosyncratic ways of processing information. Hence, one clear theme was cognitive considerations. In addition, teachers reported being mindful of the other non-cognitive challenges these students often faced. These considerations formed another theme labelled "socio-emotional". "Supporting structures", which was originally a subtheme of "Cognitive consideration", was subsequently singled out to form the third theme because it was felt it was distinctive enough to be discussed in a separate section. Each of these themes is explained in detail in the following section.

9.1. Cognitive considerations

Cognitive considerations refer to the way in which teachers designed their questions and feedback to suit the students' way of processing information. For example, the teachers made a conscious effort to be precise in their questions and feedback because students with ASD tend to be biased towards details. In contrast, vague questions such as "Do you understand?" were not helpful. As Case B teacher shared:

> Sometimes you ask the question, he may not understand it, then he will look at you and smile. Then you ask him "Do you understand?" Then he continues to smile and I will rephrase the question … my class has a more serious autistic boy, when you ask him a question, he will stare at you. So if he doesn't understand, he will shake his head.

Instead, the teachers were observed asking direct questions requiring short answers consisting of two or three words. It was also noted during lesson observations and student interviews that the students seemed to struggle with elaborating on their initial short answers or offering extended explanations. Frequently, the teachers were seen guiding them using a series of self-checking questions or steps that focus on the process to arrive at answers to more complex questions. Case E teacher shared his strategy:

> Step one, once I identify this (as inferential) question, what is this question asking for … ? Step two, I look for which part of the passage this is from. Step three, I may have to underline, er … certain key words and so on …

It was also observed that the strategy the teachers used was to prime these students to answer with a longer lead and wait time. Such a strategy appears to allow students with ASD to have ample time to decode and process what is expected. Case B teacher felt that, without the wait time, the student would not be able to focus if the teacher were also speaking at the same time.

Interestingly, the same teacher (Case B) used questions not to locate learning gaps but to allow students with ASD to explicate what was "stuck in their heads" so that she could address them in order for them to "move on".

> Because they are so fixated, you cannot correct. There is no way, you can explain and explain, because you are explaining in your own logical sense to you, but they are so fixated. So, I will usually talk about what they know. Rather than what I want to tell them … Usually I will ask them to explain to me, so you might think that it is not a question, but it is actually a question, you know. "What does this mean? How do you get there?"

The atypical way that students focused was also seen in another teacher–student pair, Case A. During the two lesson observations, it was noted that the child was fidgety and appeared not to be paying attention to the teacher. However, when questioned by the teacher during the lesson, he was able to answer correctly. The teacher commented that she had learnt that he was still listening even if he did not maintain eye contact. She noted that he might be "looking somewhere but he's listening … Because I think it's his way of listening to the teacher … the way he learns."

What was striking was how the teachers knew the students' needs and tailored their questioning and feedback accordingly. As shared by Case B teacher, who had a few SEN children in her class, including Eddie* and Roy* (pseudonyms) with ASD:

> So, the questions … the way I ask Eddie and the way I ask Roy is different.

> And Roy loves to talk, so he will. But Eddie … ok, Eddie thinks faster than he can speak and write. … (so he stutters). But I will listen and pick out the key points. So, I rephrase for him, so rephrasing is very important as well for him …

> (On the other hand, with Roy) the first question you ask him, he will get it. Give him time to think and he will come up with a response.

In short, the teachers bore in mind the distinct cognitive needs of their students with ASD and eschewed open-ended questions and feedback often espoused in AfL literature. Instead, they differentiated their approach to suit the atypical attentional networks characteristic of ASD by asking precise questions and priming their learners to keep pace with the lesson.

9.2. Socio-emotional considerations

The effectiveness of the questions and feedback also lay in the socio-emotional considerations, as teachers took care to manage the child's emotions and classroom experience through the questioning and feedback dialogue. For example, they reported trying to allay anxiety through affirming feedback such as "Wow, well done!" "You have done it", or by putting "a star for every step they have shown correctly". One shared that she made it a point to "praise [them] on the spot" when they answer or do work correctly by giving them a tap on the shoulder:

> That's my habit of giving affirmation. So, I always say "Very good, very good". Then give him a tap on the shoulders, he will be very happy. (Case C teacher)

Another (Case B teacher) was keenly aware of the anxiety faced by the students despite them being high-functioning. Therefore, after noticing that the children panicked as they struggled to answer, she shared:

> I learned my lesson, if they panic, when they start to panic, I say things like "It's ok, you try", it doesn't work. "It's ok, you try." Because … it is too late … Because their reaction has already overtaken … the whole situation.

This teacher would therefore psychologically prepare the students to answer by catching their attention first ("Roy, are you with me? Do you agree with the answer?"), but she would ask the opinions of two other students before coming back to Roy, who, by then, would have had enough time to formulate his response. She shared that she would avoid questions that asked for only one correct answer because she reasoned that:

> Children feel very threatened when you ask them "What is the answer?" Because once they do not know the answer, I mean adults also … will (feel) threatened.

Student interviews supported the effectiveness of such affirmative feedback. Case E student, when asked what sort of feedback he liked, replied "encouraging feedback".

Two teachers (Cases B and E) reiterated that "there isn't a one-size-fits-all solution" because SEN students "have really different needs". As such, "the important thing is really understanding the needs of the student". Case E teacher shared about a few occasions when his keen observations of the student's body language alerted him to the student feeling stressed when unable "to handle social interactions with his peers". This teacher enjoyed a good rapport with the student. When in doubt, the latter approached him, as well as other teachers he was "comfortable with", unlike "scary teachers", because, as the boy professed, "I get scared a lot".

The teachers in this study demonstrated their appreciation that social situations cause anxiety and confusion in their students with ASD who also have difficulties regulating their emotions. As such, these teachers addressed their students' socio-emotional needs through a safe and affirmative environment for questions and feedback dialogue.

9.3. Supporting structures

The study found it was helpful to students with ASD to have non-auditory support to supplement the oral questioning and feedback dialogue. In particular, it was observed that classroom dialogue was often supported with visuals (e.g. diagrams on the board) to help students focus. In one case (Case D), the student was not able to arrive at the correct answer despite the teacher prompting her with a series of focused questions. The breakthrough came when the teacher used the diagram on the board to highlight a critical difference from previous exercises (integrating with respect to the y axis instead of the x axis, as with previous exercises). The researcher observing the lesson noted the student's look of realization when she connected the diagram with the teacher's question. At the end of the lesson, when asked for one thing she had learnt, the student highlighted "the boundary of the integration", which alluded to the episode just described.

Another teacher participant (Case C) was observed coming to class early to write the lesson objectives clearly on one side of the whiteboard. She would also document on the board the formulae and how she arrived at the answers. In the interview, she shared that the time spent writing these on the board was worth it as they served as visible reminders and prompts to students when she asked further questions or gave feedback on the students' verbal answers. This appeared to be helpful to the student participant who was often observed to be nodding in agreement when he looked at what the teacher referred to on the whiteboard. Such an organized approach has been found to have a facilitative effect on both learning and retention (Luiten, Ames, & Ackerson, 1980).

Another strategy that facilitated questioning and feedback lay in capitalizing on the child's interest. Case E teacher used analogies based on computer games in his dialogue with the student because of the latter's interest in computer games. It was also noticed that, with another student participant (Case A), in contrast to his restlessness during class interactions, he was very engaged answering questions during a quiz using the Kahoot app.

These examples show the importance of enlisting other ways to overcome the typical ASD auditory processing challenges. As highlighted in this section, one way is to capitalize on their strong visual bias through the use of diagrams and conspicuous cues on the board. The visual display in digital learning environments such as those offered in computer games can also facilitate ASD learning.

10. Discussion

The present study sought to gather empirical evidence on effective questioning and teacher feedback in mainstream classrooms that have students with ASD. Data from lesson observation, field notes and interviews were analysed to consider the kinds of questions and feedback teachers

used and what made them decide on these approaches. Care was taken to triangulate the analysis with what students with ASD reported as effective to arrive at results that answer the main research question of what characterizes effective questioning and teacher feedback in an inclusive classroom.

Data analysis suggested three themes. First, effective questions and feedback tended to be precise and carefully scaffolded. This is consistent with good autism teaching practice because such an approach helps overcome characteristic ASD cognitive challenges in attention spans (Greenspan & Weider, 1997; Lane et al., 2010; Tomchek & Dunn, 2007; Van de Cruys et al., 2014) and understanding non-literal language (Pijnacker et al., 2009). Nevertheless, even with such accommodations, the social interaction inherent in the questioning and feedback dialogue can cause anxiety to learners with ASD (Allely, 2015: The National Autistic Society, 2017). As such, autism research supports the safe and affirmative environment for questions and feedback dialogue as demonstrated by the teachers in this study. Lastly, given both their auditory processing challenges as well as their strong visual processing bias (Kee, 2016), it is not surprising that learners with ASD benefited from the non-auditory support (e.g., diagrams) that supplemented the oral classroom dialogue.

15.1. Linking good autism practice and good AfL practice

As mentioned above, the study found strategies associated with good autism practice (Mills & Marchant, 2011; Ravet, 2018). What is worth highlighting is that these practices are also commonly found in general AfL literature (Boyd, 2015; Brookhart, 2017; Kirton et al., 2007; Ko et al., 2013; Mohr & Mohr, 2007). The findings appear to validate that what is good for these SEN students is good for their classmates as well (European Agency for Special Needs and Inclusive Education, 2015).

What the study further highlights is why such moves are successful: they address the cognitive and socio-emotional needs of the child within a larger supportive environment. These considerations align with the AfL principles of being aware of where learners are (cognitively and socio-emotionally) and deciding how best to take them to where they need to be, using a safe environment that also plays to the child's strengths (e.g. visuals).

These same lenses can also help us to understand why some AfL moves may not be suitable for students with ASD. For example, AfL proponents generally recommend probing for follow-up elaborations (e.g. Duckor & Holmberg, 2017). However, this strategy may not be helpful to students with ASD. Such spontaneous dialogue is challenging to them given their weaker propensity for communication and their anxiety about unpredictable elements. Neither is it helpful to ask unspecific questions such as "Do you understand?" given their detailed-focused cognitive style (Kee, 2016).

15.2. Implications for practice

The three considerations of cognitive, socio-emotional and support needs provide a handy framework to guide practising teachers and teacher-educators. Rather than following a list of discrete "dos and don'ts", teachers should deliberate on these three areas to design accommodations to facilitate effective participation by learners with ASD in their classrooms. As reiterated by Cumming and Van der Kleij (2016), the effectiveness of any AfL approach in meeting diverse needs is contingent upon individual teachers' in-depth knowledge of their students.

The present study has painted a picture of what is possible. The practices described show that accommodating the needs of students with ASN in a mainstream class does not have to be onerous; nor does it need to come at the expense of their classmates. This will be reassuring to teachers who already practise these strategies in class. Teachers frequently report that they are pressed for time and often use only short questions and class-level feedback as AfL strategies during lessons (Tay & Lam, 2017). Without some guidance on how they can cope better with

attending to the needs of SEN children, harassed teachers may ignore or, even worse, resent these children in the class. The findings from this study can contribute to building teacher confidence and a positive attitude towards an inclusive classroom (Yeo et al., 2010).

15.3. Implications for theory

Apart from the implications for practice, these findings also have wider implications for the current AfL discourse. First, if AfL is premised on learner-centredness, surely it cannot be "one-size-fits-all" in an inclusive classroom where there is a diversity of learner needs, especially with differences as pronounced as those of ASD. In particular, with the increasing prominence of questioning and feedback dialogue in the current literature (Brookhart, 2017; Hattie, 2015; Jonsson & Panadero, 2018; Nicol, 2010), it is important for researchers to consider if their generic models need to be modified for inclusive classrooms. The findings of the present study will be helpful in this respect.

For example, the Feedback-Interaction Model (Lipnevich, Berg, & Smith, 2016) gives a helpful overview of the process that explicates how the teacher's feedback is received by the student in a typical classroom. In the model, various characteristics of feedback are highlighted such as timeliness and accuracy. The findings of the present study do not dispute these characteristics highlighted; however, we propose that with the presence of students with ASD in the class, certain elements must take prominence: particularly on how the feedback is phrased (e.g., precise and affirming) and posed (a safe environment with sufficient wait time and priming students to answer). The manner of presentation (e.g., with supporting visuals or involving students' interest) should also be added to the current list of characteristics to make the model more comprehensive for use in an inclusive classroom.

Second, much of AfL is also premised on student agency, where students play an active role, understanding the expected criteria and standards so that they can monitor their own performance (Adie, Willis, & Van der Kleij, 2018). This is often facilitated by an interactive feedback loop with their teachers. Without proper accommodation, this question and feedback dialogue can prove challenging for children with ASD. As Ravet (2018) warns, "Without such adaptations, pupils with autism can feel adrift in classrooms that seem unpredictable and chaotic, and can become confused by learning inputs that lack meaning to them" (p.715).

11. Limitations and recommendations

One aspect that has limited the findings of the study is having clearer validation from the student participants. It proved to be harder than anticipated to obtain evidence from them. Even with a variety of precautionary measures (such as meeting the child before the study), participants offered few insights to the researcher-interviewer, often answering with "I can't remember" or "I don't know". Perhaps the study could be replicated with the interviews conducted by someone with whom the student feels more at ease.

The findings thus largely rested on the views of the teachers about what constituted effective questioning and feedback. It would have been better if there were clearer evidence from the student responses during lesson observations to support their views. Such evidence was available in Case A the lesson was conducted in a special room where there was a dedicated camera focused on the child. As such, there was richer data on the child's response to teacher-initiated interaction. It is recommended that future studies in this area using lesson observational data make similar arrangements to have a close-up video recording of the child's response for analysis.

Given these limitations, until more research is conducted to validate these findings, this study contributes suggestions of how questioning and feedback dialogue can be differentiated to support the student with ASD in an inclusive, mainstream class. In particular, further study on the framework of the three considerations (cognitive, socio-emotional and supporting structures) will be invaluable for examining how AfL can be made more inclusive in a mainstream class.

12. Conclusion

Fundamentally, inclusive education is based on the belief that every child in the class matters. It is thus important that mainstream teachers should be equipped with the understanding needed to cater to the increased diversity in the class. The present study sought to contribute to this area by examining specifically the strategies needed for students with ASD in an inclusive classroom.

Through lesson observations and separate interviews with the teacher and student participants, the study identified three important characteristics of effective questioning and feedback for such students: addressing their cognitive needs (e.g. precise and direct questions); attending to their socio-emotional needs (e.g. affirmative feedback); and using support structures (e.g. visual cues). The efficacy of three areas can be explained using AfL principles of being aware of where learners are (cognitively and affectively) and deciding how best to take them to where they need to be, using a safe environment that also plays to the child's strengths (e.g. visuals). In addition, these findings provide avenues for further study for researchers to expand the current AfL discourse to include SEN contexts. Only then can we truly say that every child matters in our classroom.

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Appendix A: Interview Schedule for Teacher Participant

I: Teacher's experience and perception

(a) Tell me a little about your teaching experience: for example, how many years, the kinds of classes you have taught.

(b) Tell me about (name of child with ASD).

(c) How do you feel about having (name of child with ASD) in your class?

(d) Who/What has helped in preparing you to teach in such classes (with ASD students)?

(e) Were there pivotal incidents in previous lessons/years that have shaped your approach in teaching such classes?

II. Teacher's AfL practice

(a) How has your teaching changed (if at all) with the presence of (name of ASD child) in your class?

(b) Specifically, how have your questioning and feedback strategies* changed?

(c) What are the questioning and feedback strategies that you feel have helped (name of ASD child)? How do you know that they were helpful?

(d) How are these strategies effective for the rest of the class?

(e) Let us now discuss some of the things I observed during the lesson. What were your intentions when you (describe episode of questioning or feedback)?

(f) Are your questioning and feedback practices the same or different in other classes this year? Across the years?

IV. Closing

(a) We have come to the end of the interview. Is there any information that you feel I should know but which was not raised earlier?

Appendix B: Interview Schedule for Student Participant

I. **Introductory questions and statements**

(a) Thank you again for agreeing to participate in this research. This interview should be completed in less than an hour.

(b) The focus of this interview is the lesson I observed the other day. The purpose is to help me understand what usually happens in class. Then I will write a report so that others can understand as well.

(c) When I write up about this study, nobody will be identified by their real name.

(d) Do you have any questions before we begin?

II: **General**

(a) Tell me a little about your school.

(b) Tell me about your class.

(c) Tell me about (subject observed) lessons. Do you enjoy them? Why/Why not?

(d) Who/What has helped in understanding during lessons?

III. **Lesson**

(a) Let us now discuss some of the things I observed during the lesson. What did you feel when you (describe episode of questioning/feedback)?

(b) Do your other teachers do the same in other classes?

(c) What would you prefer teachers do if they need to ask you questions in class?

(d) How would you like teachers to give you feedback (tell you what you have done right/wrong/what to do next)?

(e) What can teachers do in class that will really help you?

IV. **Closing**

(a) We have come to the end of the interview. Is there anything that you feel is important about how teachers can help you, and which you have not said yet?

Thank you for your time.

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Appendix C Coding Results (an extract)

Themes	Codes (Examples)	Notes
Cognitive considerations (regarding the students' way of processing information)	Questions	
	• Close-ended	Factual recall or limited range of answers (e.g., yes/no)
	• Open-ended	Various possible answers (e.g., What does this mean? How did you get there?)
	• Relational[1]	Require student to link to previous episode
	• Extended Abstract[1]	Require student to hypothesize/generalize/make judgements (e.g., Do you agree with his answer?)
	Feedback	
	• Precise	Direct instruction or information (e.g., you made a mistake here)
	• Scaffold	A series of feedback questions or comments to build to more complex task (e.g., What is this question asking? What should you do next?)
	• Process[2]	Direct attention to underlying process
	• Self-regulated[2]	Prompt student to make judgement of own work
Socio-emotional considerations (regarding the students' emotions and classroom experience)	Questions	
	• Draw attention	Help student focus (e.g., Roy, are you with me?)
	• Wait time	Allowance for student to process question and formulate answer
	• Transition	Teacher's additional question/comments before coming back to initial question directed to ASD child
	Feedback	
	• Affirmative	Personal level feedback[2] (e.g., Very good)
	• Personalised	Verbal feedback specific to the learner
	• Physical	Non-verbal response (e.g., tap on shoulder)
Scaffolding (strategies that supported the verbal questioning and feedback dialogue)	• Visual prompts/representation	Use of diagrams/written notes on board
	• Technology	Use of electronic devices/apps

Note.

1. Biggs, J.B., and Collis, K.F. (1982). Evaluating the Quality of Learning—the SOLO Taxonomy. New York: Academic Press.

2. Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81–112.

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