

Formative assessment (literature review)

Adopting a flexible definition

Various overcomplicated theoretical models of formative assessment have been proposed since Black and Wiliam's (1998b) Black Box, prompting the need for a broader inclusive model, suitable for researchers and practitioners (Rynes, Giluk and Brown 2007) in versatile educational contexts. Wiliam's most recent work has provided such a model, which has been adopted and adapted for the purposes of this research, offering a reasonable adjustment which takes account of the participants' cognitive level and diagnosis of autism. It proposes that for assessment to be formative:

1. feedback needs to be instant and timely,
2. it needs to benefit the students participating in the formative assessment episode rather than merely inform future teaching,
3. the students need to take active part in the formative assessment process, and
4. formative assessment should be used to change instruction if this can help students learn (Wiliam and Leahy 2015).

Components of formative assessment

Since the purpose of any assessment system is to determine whether students are learning, establishing a relationship between summative (results-driven) and formative (day-to-day) assessment is crucial. Historically, little evidence on formative used as a separate process to summative assessment has been recorded (Wiliam and Black 1996). Many view summative assessment as a separate, final judgement (Sadler 1989; Pellegrino et al. 2016). Black (2003) explains that even though the two processes are different, it is unrealistic to expect teachers to keep them separate; Wiliam (2000) remarks that it is important that the two types of assessment coexist '...no matter what the tensions between the two might be' (p. 16).

Teacher and student feedback (Black et al. 2003; Black and Wiliam 2009) and active student participation (Sadler 2010; Taras 2013) are essential components of formative assessment. In the absence of speech, devising a tool to enable reciprocation of feedback is central to the success of any formative assessment model. Teachers ought to adjust instruction because of formative assessment, while the outcome needs to be better than it would have been in the absence of formative assessment (Black and Wiliam 2009).

Student engagement

'Engagement' in the framework of this study is highlighted as a key component of formative assessment as it indicates the students' approval of the teaching methods, encouraging participation.

Black and Wiliam (1998) described formative assessment as 'encompassing all those activities undertaken by teachers, and/or their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged'

(7-8): the word 'engaged' is central within the framework of this study since engagement forms the basis of the formative assessment dialogue.

What type of engagement?

Within the context of this study, student engagement denotes positive behaviour and emotions (Johnson et al. 2001), while disengagement is linked with behaviours that traditionally indicate lack of attention and reluctance to complete work in the school environment (Finn 1989). Engagement can be further divided into: procedural engagement, a type of engagement that equates obediently following instructions and substantive engagement, construed as sustained involvement with academic work (Nystrand and Gamoran 1991). Even though passive, procedural engagement is significant as children can learn through observation, while disruptive behaviour can affect other students' learning.

Methodology

Aim of the research

The aim of the present research was to examine the impact of a modified formative assessment model, based on the proposed definition by Wiliam and Leahy (2015). This modified alternative will aim to serve as a practical formative assessment tool for students with autism and severe learning difficulties. Eight weeks of video observations were analysed, using a behaviour checklist to record student engagement in parallel with an objectives checklist used to record attainment.

'Case research is particularly appropriate for certain...problems: those in which research and theory are at their early, formative stages' and 'sticky, practice-based problems where the experiences of the actors are important and the context of action is critical' (Benbasat et al. 1987, p.369). Given how heterogeneous a group students with autism are (Daniels and Mandell 2013), each of the students was conceptualised as a separate case. The contextually dependent changes (linked with the idiosyncrasies and heterogeneity of the individual cases and the ability of the other actors involved to interpret non-verbal feedback), deem the case study methodology appropriate.

A formative assessment friendly environment was established within which the four principles of formative assessment as established by Wiliam and Leahy (2015) were applied. Inherent to the methodology employed were the intervention choices, based on a sound theoretical framework and designed to capture student contributions. A detailed description of the theoretical framework will follow as it shapes a significant part of the methodology.

Methods

Video observations were employed to address the need to act as a practitioner researcher and record student reactions as a method of student feedback, a component of formative assessment (Wiliam and Leahy 2015). Video served as a tool to test initial assumptions and to repeatedly view to ensure better accuracy of the interpretation of body language.

To serve with formative and summative assessment being treated as parallel processes, two checklists were devised: the academic objectives checklist to evaluate whether a

student had made academic progress in the subjects of Literacy (reading) and Numeracy (numbers); and the behaviour checklist, used to assess student engagement through a shortlist of typical student behaviours, based on a termly observation schedule that took place prior to the commencement of the research and based on the 'Affective Communication Assessment' handbook (O'Kane and Goldbart 1998). The exhibited behaviours were categorised as positive (i.e. behaviours that demonstrated student engagement-colour coded in green) and negative (behaviours that indicated disengagement-colour coded in red). An example of such positive and negative behaviours included in the checklist (Aidonopoulou-Read 2017) and separated into body regions has been highlighted in the Table 1 sample below:

Table 1 to go here

Examples of objectives placed in the academic checklist included the following:

1. To demonstrate an interest in number games, rhymes and songs (mathematics)
 2. To join in and indicate at least one number in a familiar rhyme or song (mathematics)
- and
1. To watch an adult point to pictures (literacy)
 2. To match objects to pictures & symbols (literacy).

A sample of the objectives checklist is provided in Table 2 below:

Table 2 to go here

These objectives were derived from the Highland school curriculum as the students were performing at a level lower than Level 1 in the National Curriculum (<https://www.gov.uk/national-curriculum/key-stage-1-and-2>).

Some of these objectives required active participation (such as objective 2 in mathematics above) linked with active engagement, while others required passive participation/compliance (like objective 1 in literacy) linked with procedural engagement.

As often rewards and appealing resources have been rated as significant factors assisting in student engagement (discussion to follow) the use of conventional resources (like, for example, the picture of an object) versus sensory resources (for example, a light-up toy) and how those affect student engagement was evaluated while introducing and withdrawing them at different stages of the research.

Specifically:

Week 1-No engaging resources and no rewards (regular resources such as pieces of paper with pictures were used for teaching),

Week 2-Engaging resources (resources such as, a flashing lights toy were used instead of pictures of the objects),

Week 3-Engaging resources

Week 4-Engaging resources

Week 5-Engaging resources no rewards (this included giving no tangible rewards or praise)

Week 6-Engaging resources and rewards (frequent praise and tangible rewards offered)

Week 7- Engaging resources and rewards

Week 8-Engaging resources and no rewards

Materials

The employment of rewards

Reward systems have been systematically used in education to shape behaviours (Wearmouth et al. 2004), stemming from the behaviourist principles of positive reinforcement as underlined by Skinner (1974). The use of tangible rewards as well as recognition and praise were utilised within the research context to further encourage positive behaviours.

Williams (2017) underlines that using tangible rewards is a visual (a strength in autism as Pirtle and West 2014 confirm) way of acknowledging that the teacher is pleased with their student. Extrinsic rewards can encourage intrinsic interest in lessons (Bradley 2003), gradually eliminating the need for external forms of reinforcement.

Recognition and praise have also been judged as effective reward methods since they are linked with noticing, validating and acknowledging learning (Cameron et al. 1997). Alongside tangible rewards, praise and positive reactions were employed during the research, taking social difficulties that come with autism into consideration (DSM-5 2013), which may deem certain 'positive' reactions inappropriate and more likely to cause distress than reinforce positive behaviours. Differentiation between desirable and undesirable behaviour was

achieved by stating 'no' (Skinner 1974) and ignoring any further instances of undesirable behaviour.

Even though the behaviourist approach has been heavily criticised (Khon 2006) for damaging the students' ability to get intrinsically motivated, other larger studies indicate that the most effective educational contexts use rewards and punishments to shape behaviours and praise and rewards are associated with greater intrinsic motivation (Bear et al. 2017).

The employment of engaging resources

Individuals with autism have been found to have a high interest in engaging objects (Thorup et al. 2016) while the use of attended engaging objects (that is, objects presented by the teacher as opposed to objects presented on their own) can increase gaze fixation, a positive behaviour that is particularly challenging for students with autism (Falck-Ytter et al. 2015; Swanson and Siller 2013). It has also been observed in interactions between mothers and children that it is the object rather than the mother that is focused on, a characteristic of prelinguistic behaviour (Yorke and Warren 1998). Since the behaviour checklist is based on the participants' prelinguistic behaviour the use of engaging objects was utilised as a means to encourage student participation in the formative assessment process.

Participants

The five participants in this study were non-verbal and had been diagnosed with autism and developmental delay which significantly limited opportunities for meaningful communication and interaction or active engagement and participation. To appreciate how the students' baseline and idiosyncrasies influenced the adjustment of the William and Leahy (2015) formative assessment model, a concise description of the participants and the communication and methodological challenges deriving from interpreting behaviour will follow.

With the exception of Natalie who had some spoken language (mostly echolalic), the rest of the participants could vocalise to express a variety of feelings, but they could not make any combination of sounds that formed words.

Susan was unmotivated and relied heavily on physical prompting to perform any task including standing up or looking at and choosing symbols. When engaged, Susan could differentiate between a minimum of four symbols, however she would often lose interest, shifting her focus and engaging in self-stimulatory behaviours (such as vocalising and hand flapping), instead.

When Steve was first taught by the researcher, he presented a similar profile with Susan. Since then he had progressed and started producing sentences and differentiating between a minimum of eight symbols using his communication book.

Ben's eye condition prevented him from seeing clearly and he was reluctant to use his glasses which corrected his vision. This created difficulties as he enjoyed flicking his hand in

front of his eyes to stimulate his vision, which affected his ability to focus on symbols. He could differentiate between a maximum of four symbols, primarily because he was more interested in physically interacting with an adult and gaining negative or positive attention rather than concentrate on looking at the symbols.

Natalie used echolalic (repetitive) language and she enjoyed humming to herself. She was able to use symbols to construct sentences when motivated. However, there was considerable variability in her willingness to speak, use symbols, communicate or take part in activities: there were no clear indicators as to what motivated Natalie.

George communicated with adults through pointing and vocalising, mostly used to attract attention. In the classroom, he tended to display undesirable behaviour (e.g. throwing objects, pinching, leaning against an adult or child) in order to receive negative adult attention: in response, he would smile and vocalise loudly or cry if ignored. His academic performance was heavily affected by this behavior: he could differentiate between a maximum of four symbols as a result.

Ethics

The BERA Code of Ethics (2011) was followed when planning and carrying out this piece of research. In the absence of student consent, direct parental consent was gained but the researcher also looked for signs of distress or disapproval of the use of cameras during the observations.

The researcher's familiarity with the setting and her dual role as the children's teacher and a researcher, created the potential for bias. As Hallett and Hallett (2012) pointed out '...the inclusive teacher would see research as an integral part of their role-a means by which they can question their own practice to enhance teaching and learning for all' (p.110), which encapsulated the researcher's motives acting as a practitioner-researcher.

The conceptual framework

Procedure

Central to the understanding of the context of this study is the understanding of the communication needs of students that have autism and severe learning difficulties.

As the students had both cognitive (Jordan 2001) and communication (DSM-5) difficulties, wordy teacher feedback was ineffective. Single word, positive teacher feedback for meeting objectives was given alongside rewards and interesting resources. Rewards and resources were carefully selected and personalised after termly observations prior to the commencement of the research.

Receiving student feedback in the absence of functional social communication either through symbols or through spoken language, took place through one of the remaining modes of communication, body language: 60% of communication is non-verbal (Greene and Burlison 2003) and informal formative assessment (Ruiz-Primo 2011) allows for body language to serve as formative feedback, a necessary component of the William and Leahy (2015) model.

Posing a further challenge was that non-verbal communication difficulties are present in autism (DSM-5 2013): such can be difficulties in eye contact (Wing et al. 2011; DSM-5 2013), using facial expressions in an atypical manner and atypical gaze (Sasson et al. 2016). This led to incorporating the methodological model proposed by Simmons and Watson (2014) to address the interpretative challenges of idiosyncratic versus intentional behaviours: they explained that students who have cognitive difficulties need a methodology that can capture the experiences of children that have ‘...behavioural idiosyncrasies...’ and the ways that their ‘...mobility, sensory and cognitive differences may lead to personalised forms of action...’ in devising a ‘methodology based on explicit forms of interpretation’ (p.132).

The communication checklist (Aidonopoulou-Read 2017) was aimed at giving meaning to behaviours allowing the students to be active participants in the formative assessment process and shaping future practice. As the behaviours are often labelled as idiosyncratic, this can mean that they are subject to interpretation, which may be inaccurate or occasionally accurate. However, idiosyncratic does not equal unintentional, an idea put to the test through the behaviour checklist.

Even though the behaviour checklist was created to be adaptable, isolating the behaviour from the child would be ill-advised: as Simmons and Watson (2014) remarked, ‘If the researcher wishes to determine the meaning lying behind the actions of a child (assuming the action was intentional) there are only so many motives surrounding why a child would perform the action...’ but if the researcher tries to isolate the child’s intentions from the action they could end up with an unlimited number of possibilities ‘...which potentially could be very far from the actual intentions of the child’ (p. 134-135). Therefore, familiarity with the child is a central element when one tries to utilise a tool such as the behaviour checklist, deeming subjectivity a necessary component of the study.

Central within this context, is the consideration of the purposes of communication. Functional communication is used to inform each other of our needs while social communication is aimed at sharing information with others such as our emotional state (Caldwell 2013).

Functional communication within the framework of this study has been used to assess the students’ academic progress. For this reason, a symbolic system of communication known as Picture Exchange Communication System (PECS) (Caldwell 2013) was employed to enable the students to give their answers to questions of academic nature, information that was used to define whether they had met lesson objectives. The students’ ability to use this system was limited, therefore only serving as a tool to answer closed questions within the session. It was not the aim of this study to assess emotional engagement (Caldwell 2013) even though the desire for an ‘untimely’ need for emotional engagement, appeared to be an obstacle to academic achievement in the case of two students, while the established relationship between student and teacher may have contributed to one student’s high performance level.

Central to understanding the meaning of student feedback requires the understanding of the Theory of the Autistic Mind as defined by Bogdashina (2006): this implies that the teacher needs to be highly sensitive to the thoughts and perspective of the student, a skill that is acquired through familiarity. The lack of Theory of Mind (Bogdashina 2006) on the

part of the student may inhibit the understanding of what the teacher is thinking or planning to do, complicating the reciprocation of feedback, an essential component of the formative assessment process.

Significant to note is that children with autism and severe learning difficulties have both a deviant and delayed learning pattern (deviant is attributed to autism and delayed to severe learning difficulties) (Jordan 2001). They are also unmotivated and will not perform to please due to their impaired theory of mind (Bogdashina 2006). The P scales provide smaller learning steps (Imray and Hinchcliffe 2012) which address the issue of delayed learning, however since they respond to a linear developing pattern, they do not address the issue of the deviant learning. Therefore, recording 'naturally occurring' progress through time may be inapplicable for these students, who may initially meet an objective, but fail to meet the same in the following session due to their non-linear progress and lack of motivation, which the interventions attempted to address and the behaviour checklist aimed to monitor.

Results

To illustrate how the tools employed provided an operational formative assessment framework, representative example- behaviours resulting from the introduction or withdrawal of rewards and engaging resources will be provided. Table 3 contains a summary of the findings in relation to the effectiveness of the behaviour checklist as a method for evaluating the students' level of engagement as well as the relationship between engagement as recorded through body language and attainment. A discussion of how this fits in with William and Leahy's (2015) framework will follow.

Table 3 to be placed here

Procedural engagement versus active engagement

Natalie

Natalie demonstrated no procedural engagement, exhibiting her lack of 'cooperation' through her behaviour. She often sang to herself and tapped her chin (idiosyncratic behaviour) while turning away from the resources to illustrate her unwillingness to participate. Characteristically, she met neither of the two objectives linked with passive cooperation in literacy for the duration of the study.

A representative example of active engagement was observed during lesson 7 in maths. She started shaking her hands with excitement and smiling when presented with a party popper. She got up independently, approached and touched the screen (intentional behaviour) while taking the number symbol down to indicate her understanding of quantities. She was alert and sitting upright throughout, and she met all her objectives independently. Her engagement with the lesson was obvious through her relaxed and positive body language, resulting into exhibiting green/positive behaviours indicating student engagement.

George and Ben

George and Ben's main behaviour dictating most of their interactions during the school day was their wish for adult attention, possibly stemming from their desire for emotional engagement. The dominance of this behaviour limited their ability to fully engage in the classroom, even though they did display elements of interest. George's best performance was observed in lesson 7 in numeracy when he met five and partially met two of his objectives. During that session he reached for resources independently anticipating actions, a sign of active engagement. By the final task it was evident that his level of engagement had changed as he needed physical support to stop touching his face (idiosyncratic behaviour) and he covered his ears as he approached the table on which the teaching resources were being kept. This indicated his disengagement, which could have resulted from the length of the session or his dislike for the task, or simply the fact that he wanted to switch focus. Even though this session included both interesting resources and rewards, one cannot assume the effectiveness of the two as George's performance was not affected positively in the rest of the sessions that included both (or either).

Ben was often distracted and inattentive, which could be linked to his poor eyesight making resources and materials inaccessible. Two contrasting examples of engagement and performance indicated he was affected by the presence of engaging resources: those were lessons 3 and 4 in literacy. In lesson 3 Ben achieved two of the objectives and partially achieved one. The objectives Ben achieved were linked with passive participation and interest (also observed with Susan) such as listening and attending a story and recognising key objects relevant to the story. However, he did not meet the objectives that demanded active participation such as commenting using symbols or taking turns. Instead, he engaged in behaviours such as staring at the adult while choosing the wrong symbol or keeping hold of the 'parcel' and not passing it on and looking at the adult assisting him intently, something also possibly linked with his (contextually inappropriate) desire for emotional engagement.

There is, however, an example of recognition and praise rewards being effective for Ben. In lesson 3 (literacy) Ben kept trying to gain adult attention by continuously tapping the wrong symbol and looking at adults intently. When the teacher moved on without acknowledging his behaviour and upon given a second chance to respond he had a serious facial expression, carried on looking at his teacher and instantly chose the correct symbol. This was met with praise and individual attention, a reward that appeared effective for Ben as his good performance continued for the rest of the session.

Susan

Susan's behaviour in literacy and numeracy varied and appeared to be closely linked with the presence of engaging resources and rewards, even though the latter did not appear to strongly affect the performance of the rest of the students, creating the assumption that the use of tangible rewards was indifferent to most. In contrast to Steve, Susan's negative behaviours appeared to predict her level of engagement and performance for the whole session.

Susan began lesson 1 in literacy sitting upright and being alert with the expectation of discovering the contents of the parcel. When she opened and established it was a picture rather than an item, she started scratching her head, vocalising loudly and leaning in different directions, (idiosyncratic) behaviours that were labelled as negative and were possibly indicative of her disappointment and disengagement. Lesson 2 in literacy, when engaging resources were introduced was a remarkable contrast to lesson 1. She sat upright, looking around the classroom and following the resources with her eyes, holding excellent eye focus. She needed some support to pass the parcel as she was interested in its contents, an indication of her engagement rather than lack of cooperation. Positive behaviours she displayed included turning towards the resources, watching while other students were having a turn, being alert and sitting upright during her and her classmates' turn, linked with both procedural and active engagement.

Steve

Steve's level of engagement appeared unaffected by the presence or absence of engaging resources or rewards and there was little connection between behaviour and achievement. In lessons 1, 5, 7 and 8 in numeracy Steve met all the objectives, while his worst performance was observed in week 3, when interesting resources were present. Rewards had no obvious effect on Steve's level of engagement and he only partially met one objective in week 6 when rewards were available.

In literacy, Steve's best performance was observed during weeks 7 and 8, when he met four objectives and partially met one. Interestingly, Steve displayed his best performance during week 1 when interesting resources were not present, while his performance deteriorated and by week 4 he had partially met two objectives, preceded by week 3 when he had partially met three.

Characteristic about Steve and his performance was that even when he presented with negative behaviours, his performance linked with active engagement and participation was unaffected. During session 1 in literacy, when his performance was strong, he kept vocalising loudly, appeared to be absent-minded and kept staring into space. He jumped out of his chair and screamed, and at times was shaking his head (idiosyncratic behaviours), however when it was his turn to comment he would suddenly go silent and turn towards the symbols. Even though he needed physical support and prompting at different times, he was successful when commenting, leading him to achieve three objectives and partially achieve another two.

Examples of procedural engagement were witnessed during maths lesson 7, when Steve sat upright, paying close attention even when it was not his turn, looking at the resources carefully, thinking, participating and having a thoughtful facial expression. Lesson 8 was similar, with Steve being extremely focused even when it was not his turn, similar with lesson 5 when he also stood up and signed 'me' indicating active interest in the lesson.

Steve's level of engagement appeared to be linked with being intrinsically motivated by the lesson itself rather than the presence of rewards or interesting resources. He is likely to have developed emotional engagement with his teacher despite his social difficulties.

Discussion

The following examples are to illustrate how this adjusted model can fit within Wiliam and Leahy's (2015) criteria:

1. feedback needs to be instant and timely:

Instant teacher feedback appeared to be effective based on examples such as Ben's behaviour in lesson 3 in literacy in which he responded to being ignored (disapproving teacher feedback) by adjusting his actions to achieve praise and emotional engagement.

2. formative assessment needs to benefit the students participating in the formative assessment episode rather than merely inform future teaching:

Ben benefited from instant feedback, changing his response and meeting his objective. Adopting the use of rewards and engaging resources also appeared to be an effective way of benefiting students like Susan within the same session, by shifting her focus and engaging her attention.

3. the students need to take active part in the formative assessment process:

Through the communication checklist the students were able to give their indirect feedback about activities and resources they enjoyed, while their academic progress was monitored through the objectives checklist. The results indicate that increase of idiosyncratic behaviours broadly aligns with disengagement, while increase of intentional behaviours aligns with active engagement. Idiosyncratic behaviours are often self-stimulatory, an indication that failure to engage students through the lesson can lead to those, while intentional behaviours are deliberate and aimed at engaging with the world around us, deeming the lesson successful.

4. formative assessment should be used to change instruction if the modifications implemented can help students learn:

Strong from the findings appears to be the need for individualised interventions. Some students, for example, would benefit from emotional engagement rewards (Ben and George), while others (like Susan) may benefit from tangible rewards and interesting resources. Natalie could benefit from a preparatory session to enable her to start the lesson in a prime position for learning by monitoring her mood, while Steve would possibly benefit from occupational therapist input to help him control his idiosyncratic behaviours. This is in line with Simmons and Watson (2014) and the individualisation of the assessment process.

Limitations

It needs to be acknowledged that the adjusted formative assessment framework proposed is controlled by the teacher, who is the one that facilitates and subjectively interprets

communication. Still, as Simmons and Watson (2014) highlighted, knowing the individual and their behaviours is essential when attempting to interpret body language.

They also highlighted that interpreting behaviour (even when it is idiosyncratic), is not only desirable, but also a need that should be met when dealing with individuals with complex needs.

One could propose that the changes observed may have been a result of time and they would have inevitably occurred. However, the academic checklist gives no indication of linear student progress, with objectives being consistently met once achieved (in line with Jordan's previously recorded observation). Non-linear progress and an unusual learning pattern can suggest that time can be considered less of a defining factor when it comes to student progress in the case of students with autism and severe learning difficulties.

Conclusions and implications for future research

The adjusted model proposed is suggestive of the possibilities for using body language as a means for receiving non-verbal student feedback; the plausibility of a combined formative and summative assessment recording tool which can be embedded in the day-to-day curriculum; and the opportunity to involve students that have cognitive and social difficulties in a formative dialogue.

Implications for future research

Practitioners in diverse learning contexts could adjust and use this modified formative assessment model with a wider selection of students with cognitive and communication needs and evaluate its versatility and applicability.

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Table 1-Sample behaviour checklist

<i>FA observation Recording sheet</i>		Lesson					
POSITIVE BEHAVIOURS- green NEGATIVE BEHAVIOURS-red		Student					
Time		FA observation sheet					Contact time Activity
Body part	Name: FC	Introduc tion of the symbols	Activ ity	Activ ity	Acti vity	STIMU LUS	General observat ions
Head	Rotating towards stimulus						
	Head down/turning away						
	Smiling/laughing						
Face	Sad/downcast						
	Frowning/twitching						
	Pleased/glowing						
	Glance at object briefly						

Table 2-Example of objectives checklist

Table 8.4: Susan's responses to rewards for completion of mathematical tasks				
Objectives	Week			
	5	6	7	8
	NRE*	RE**	RE	NRE
1.To demonstrate an interest in number games, rhymes and songs. (P4)				
2.To join in and indicate at least one number in a familiar rhyme or song. (P5)				
3.To give 1 object on request. (P4)				
4.To follow a sequence of pictures or numbers as indicated by adult during number activities. (P4)				
5. To assist with a 1:1 matching activity. (P4)				
6.To pick up and put down a single object. (P4)				
Total number of objectives met	0	1	1	0
Total number of objectives partially met	1	5	5	6
*No rewards **Rewards				

	Objective achieved
	Objective partially achieved
	Objective not achieved

Table 3-Engagement, attainment and the two checklists

Student	Natalie	Simon	Susan	Ben	George
Behaviour checklist results					
Positive behaviours indicated engagement	√	√	√	√	√
Negative behaviours indicated disengagement	√	√ Note: Simon had a lot more control on his negative behaviours, enabling him to meet active objectives even when disengaged.	√ Note: when tangible rewards were introduced she paused many of her negative behaviours, but this did not affect her performance.	√	√
Academic checklist results	Natalie was more likely to meet her active objectives when engaging in positive behaviours.	Simon's performance when it came to active objectives was not affected by his negative behaviours as he was able to pause those and perform. However, his passive objectives were more rarely met when he was disengaged.	Susan was more likely to meet her active objectives when she displayed positive behaviour, however she appeared to find positive behaviour difficult to sustain for long periods of time, rarely meeting all her objectives in one session. Her passive/procedural engagement was rather poor leading her to rarely meeting her passive objectives.	Ben's attainment was directly linked to his behaviour for both passive and active objectives and a good indicator of his level of engagement.	George was the same as Ben.
Behaviour checklist consistent with the objectives checklist?	Active objectives would be met when positive behaviours were in place. Meeting passive objectives, requiring procedural engagement were a lot less predictable based on the behaviour checklist.	The two lists were consistent with each other, especially when it came to passive objectives, however the student had greater control over his behaviour when it came to active objective as he was able to pause negative behaviour to engage with the activity and give the correct answer.	The behaviour checklist was a good predictor of attainment, with the tangible rewards adding a complication as Susan would often cooperate and display positive behaviours to obtain a reward.	There was a direct link between positive behaviour and achievement and negative behaviour and not meeting objectives.	Same as Ben