Does Implementing Sensory-Based Activities Prior to Learning Improve Levels of Engagement During Teaching and Learning Activities?

Action Research Project by Amy Kemeridis

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Introduction

I have worked in the area of Special Educational Needs (SEN) for at least 10 years. Initially starting as a support for individuals with SEN and eventually progressing to teaching full time in a secondary SEN school. I have been in the full time teaching role for the past 5 years and have predominantly worked with pupils aged 16-19 years. During this time I have completed studies in Autism and it has become an area of great interest over the years as its complexity allows for constant and ever changing opportunities to learn. One of the most common things associated with Autism is sensory processing difficulties. More recently I have found interest in the area of sensory integration. "Sensory integration is the organisation of sensations for use." (Ayres, 2005) In short, sensory integration is how our brains organise, make sense of, give meaning to and use the information received by our sensory systems. Most people are aware of the 5 senses - touch, taste, sight, feel, smell. However we actually have at least 3 more sensory systems, this is something I will explore later within the literature review.

Although my passion initially sparked with Autism and I have worked with and continue to work with many pupils with Autism Spectrum Disorders (ASD), I have varied experience of supporting pupils with a range of needs, diagnoses and abilities. What I have observed is that it is not only the pupils with ASD that often have difficulties with sensory processing, it is something many pupils who don't have an ASD diagnosis have difficulty with in one or more areas.

Within my class alone, there are 8 pupils - 3 male and 5 female ranging in ages 16-19 years. Amongst them there is 1 pupil with ASD, 3 pupils with Down's Syndrome, 3 pupils with Severe Learning Difficulties and 1 pupil with Global Developmental Delay. As well as their differing diagnoses, difficulties and abilities they are all individuals with their own interesting and endearing personalities. They also learn, interact and engage in differing ways. This often means it can be difficult to maintain engagement amongst all pupils during teaching and learning activities. As teachers we should continuously be proactive in developing and finding new strategies to support our pupils.

For these reasons as well as it being of interest to me, I have decided to focus on the relationship between sensory-based activities and engagement amongst pupils for this Action Research Project. I want to explore if implementing sensory-based activities prior to learning will improve levels of engagement during teaching and learning activities.

What is Action Research?

The term 'Action Research' was initially established by Kurt Lewin and is something that is widely used throughout the education sector. Adelman (1993, p. 8) discusses Lewin's idea as being more of a collaborative group effort in order to provide reflective, informative and collective discussions and thought processes to improve on shared issues. However, there are different types for Action Research, they include: individual, collaborative, school-wide and district-wide. For the purpose of this project, I will be focusing on individual Action Research which "...specifically refers to a disciplined inquiry done by a teacher with the intent that the research will inform and change his or her practices in the future." (Ferrance, 2000) The purpose of it is to highlight a problem or difficulty within your personal area of teaching and investigate ways to improve, evaluate the effectiveness of and reflect upon your practices in order to ultimately improve as an educational practitioner.
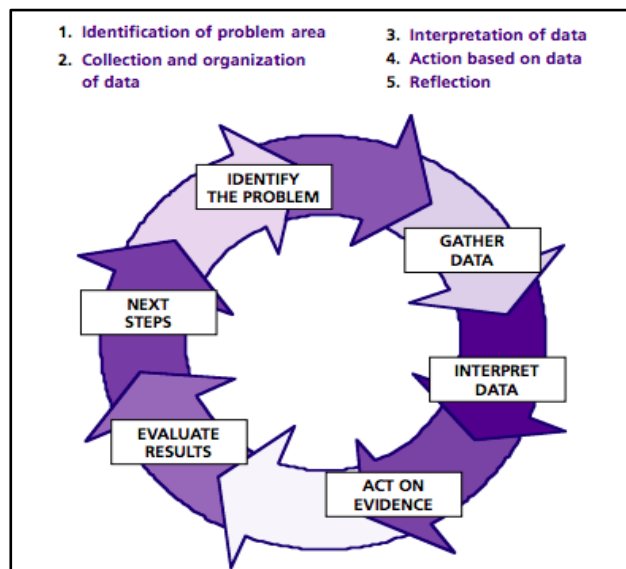
The Action Research process is cyclical and can be interpreted in a few ways and usually follows a 4 or 5 step cycle. Below in Figure 1 and Figure 2 is an example of two Action Research models:

Figure 1.

(Boone, 2016)

Figure 2.

1. Identification of problem area
2. Collection and organization of data
3. Interpretation of data
4. Action based on data
5. Reflection

(Ferrance, 2000)

Both of the above models incorporate the same features, however Ferrance slightly breaks down the process more. Where steps 1 through 3 are shown in Ferrance's model, Boone incorporates these features in his first process 'planning'. The features of Boone's Action Research process are explained in the table below.

Figure 3.

Planning	This stage begins with identifying the problem or area for improvement. Then it moves on to organising the project. This could include; research existing information on the topic, decide on the methods of research that best suit the project, develop and gather any necessary resources, liaising with other professionals that can impart knowledge/support, identify a time frame and determine whether a budget is required.
Acting	The Acting stage of the process is where all the planning comes to fruition. You trial the selected methods, collect the data and observe and make changes where necessary.
Observing	Observing is where you analyse the process and write up and share your findings. This can be done by writing the report and discussions with colleagues/interested or involved parties.
Reflecting	The reflection stage of the process is where you evaluate your findings and determine whether your initial questions were answered and if the identified problem has been improved or not. If it hasn't then you assess why and determine next steps going forward.

There are many advantages to Action Research. It can "…allow teachers to recognise their weaknesses and improve on them in order to increase student experience." (Pros and Cons of Action Research, 2021). This in turn will support the organisation as the further development of its employees shows positive progression and ultimately better outcomes. Some of the implications when conducting Action Research are that it can be very time consuming. Within the education sector, lack of time always seems to be a factor across the board and no matter what role you have. Action Research can also be quite static in that the information gathered is specific to that individual, their environment/project, their time frame etc. so it can be less applicable across the board.

There are many different methods for Action Research and the ones you choose will depend highly on what you are trying to achieve, the individuals you will be working with and the resources you have available to you. These can include, but are not limited to:

- Observations
- Surveys
- Taking pictures
- Audio and/or video recording
- Note taking

Data can be collected in any of these ways and will be either qualitative, quantitative or both. McLeod (2019) explains the difference between the two as; quantitative data is focused on quantities i.e. numbers, and qualitative data is descriptive which is observed but is difficult to measure i.e. language.

There are advantages and disadvantages to both forms of data collection and you will have to choose the method/s that best suit the nature of your project.

Figure 4.

Qualitative Data Collection	
Advantages	Disadvantages
- Allows for full context of a situation meaning more detailed analysis. - Easier to obtain e.g. observations vs surveys.	- Can be difficult to analyse accurately as it can be subjective/biased. - Time consuming.
Quantitative Data Collection	
Advantages	Disadvantages
- Easily interpreted statistically. - Usually unbiased. - Less time consuming.	- Can be difficult to grasp the full context of a situation. - Larger sample sizes are usually required.

Qualitative and quantitative data collection can complement each other and quite often, a mixed approach is necessary. For the purpose of this Action Research project, I have used a mixture of both qualitative and quantitative data collection. These will be detailed later when I discuss initial planning and intervention strategies.

Literature Review

Before being able to conduct my Action Research project to determine whether implementing sensory-based activities prior to learning increases levels of engagement during learning activities, I first had to review some of the literature around this particular area of research.

First of all I wanted to gain a better understanding of the sensory system and what exactly sensory integration is. As previously mentioned in my introduction, it is not commonly known that we all have at least 8 different sensory systems.

1. Visual (sight)
2. Auditory (sound)
3. Olfactory (smell)
4. Gustatory (taste)
5. Tactile (touch)
6. Vestibular
7. Proprioception
8. Interoception

I won't go into detail about the first 5 senses as these are self-explanatory and universally understood. However, I will give a brief description of the latter sensory systems as they are less known and a little more complex.

Figure 5.

Vestibular	This sensory system is responsible for our balance and our positioning in space. "...informing us about movement and position of head relative to gravity." (Your 8 Senses, 2021)
Proprioception	Our proprioceptive system "...senses the position, location, orientation, and movement of the body muscles and joints." (Your 8 Senses, 2021) In short, it tells our brain how to move our body. An example of this is if you were to close your eyes, your brain could tell your hand to bring a spoon to your mouth without the need for seeing it.
Interoception	This sensory system is responsible for everything that goes on internally. It is what tells us when we are feeling hungry and thirsty, when we need the toilet and it allows us to be aware of things such as our heart beating.

It is important to have an understanding of these different sensory systems and how they work in collaboration with each other in order to have an understanding of Sensory Integration. I have already touched on this briefly already in the introduction. Dr. A Jean Ayres is responsible for the development of the sensory integration theory and in her book 'Sensory Integration and the Child' she explains it in great detail as being the organisation of our senses for use (Ayres, 2005) . Every system has its role to play and they work in collaboration to support our understanding of physical self.

Some individuals have difficulties with their sensory integration and may be diagnosed with a Sensory Integration Disorder (SID) or Sensory Processing Disorder (SPD). This happens as a result of "...the brain's inability to integrate certain information received from the body's sensory systems." (Sensory Integration Disorder - Lanc UK, 2021). SID/SPD can be quite common amongst pupils with Special Educational Needs and it is important to acknowledge that this may not always be something they have a diagnosis of. However, the difficulties these individuals present with when it comes to sensory integration can often result in difficulties in other areas such as engagement and learning.

Whilst researching the literature, I wanted to find strategies that I could implement to support my project. I looked into two different interventions that support sensory integration and made a decision on which one would best suit the needs of my pupils. I researched Sensory Diets and Sensory Circuits.

<u>Sensory Diets</u>

Sensory diets are designed for individuals and are tailored to their particular sensory needs. Kelly (2021) describes them as a treatment for children who suffer with sensory processing issues. They usually include a series of different physical activities that target specific sensory systems to support the needs of the individual. Often sensory diets are created by Occupational Therapists (OT). As sensory diets are usually for individual use, I quickly decided they wouldn't be an appropriate sensory-based strategy to use for my Action Research project. I am aiming to support all pupils in my class to be able to better access teaching and learning activities and it would not be practical to create an individual sensory diet for each pupil. This would also take a lot of time to not only meet with the OT to develop these plans, but the implementation would also take time and resources that would just not be feasible. Figure 6 is an example of Sensory Diet activities designed with a focus on supporting the Vestibular system.

Figure 6:

(What is a sensory diet?, 2021)
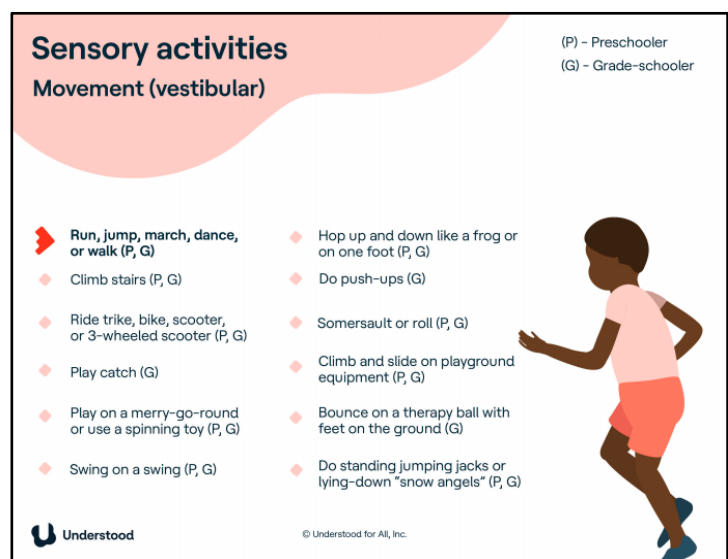
Sensory Circuits

Sensory Circuits are similar to Sensory Diets in that they are designed to support sensory integration, however they are usually not specific to one area of the sensory system and are intended for use by all rather than tailored to the individual. The aim of a Sensory Circuit is "...to achieve the 'just right' or optimum level of alertness required for effective learning." (Sensory Circuits - Childrens Choice Therapy, 2021)

As my Action Research project aims to determine whether introducing sensory-based activities improves levels of engagement during learning, Sensory Circuits appeared to be the right fit to support in answering this question. The next step was to explore what happens in a Sensory Circuit and how to implement them.

In the book *Sensory Circuits - A sensory motor programme for children,* Jane Horwood (2009) states that Sensory Circuits as an idea were developed on the basis of the sensory processing and sensory integration theories. The circuits themselves are divided into 3 sections:

1. Alerting
2. Organising
3. Calming

Horwood (2009) explains how these 3 sections work:

Figure 7.

Alerting	This section provides vestibular stimulation. It assists in preparing the brain to be available for learning.
Organising	This section used a multi-sensory processes and balance. It requires individuals to organise their body to be able to do more than one thing at a time. It supports the development of focus, attention and performance.
Calming	This last section is important as it supports individuals to be calm and centred in preparation for the remainder of the day.

Below are some examples of activities that can be used for each section in a Sensory Circuit:

Figure 8.

Alerting	Organising	Calming
Skipping Running Bouncing on a ball Star jumps	Balancing Target throwing Simon Says Weaving through objects	Push/pull exercises Deep pressure Bear hugs

Each section has a very important role and the circuit must be completed in the correct order to gain the optimum desired result. Ideally, a Sensory Circuit should be run at the beginning of every day and if possible again right after a break time (preferably lunch). This is important as it prepares individuals for their day of learning and can help to reset after unstructured time.

As well as implementing Sensory Circuits for this project, I had to consider how I would collect data on my pupils. As previously mentioned, the pupils in my class have a range of diagnoses and abilities so this had to be considered when deciding on which method/s of data collection I would use. For the most part, I would have to observe their behaviours, moods and levels of attention prior to and post Sensory Circuit. But how would I record this? I had multiple conversations with the Occupational Therapist in my setting during the initial planning and intervention stage of the project. Together we agreed that I could use The Zones of Regulation as a way to monitor and track any changes to pupil behaviour, mood and alertness.

The Zones of Regulation were developed by Occupational Therapist Leah Kuypers. She explains them as being a way to create "... a systematic approach to teach regulation by categorizing all the different ways we feel and states of alertness we experience into four concrete colored zones."(Kuypers, 2021)

The four coloured zones are detailed below. Each zone shows which emotions/feelings/levels of alertness corresponds to the colour.

Figure 9.

Blue	Green	Yellow	Red
Sad Bored Tired Sick	Happy Focused Calm Proud	Worried Frustrated Silly Excited	Overjoyed/elated Panicked Angry Terrified

Fortunately, my class had previously taken part in Zones of Regulation lessons that were run by the Occupational Therapist in my setting. Myself and my class team supported her with this which meant all members of my classroom (staff and pupils) had an understanding of The Zones of Regulation. This was ideal as I chose to use the recording sheet as part of my data collection. An example of this from Leah Kuypers book '*The Zones of Regulation'* is shown in Appendix 1.

As part of the 'Acting' process of this Action Research project, I used this recording sheet and I will discuss it in more detail further down in the Implementation section.

Why implement Sensory-Based Activities?

Initially when deciding on my topic for this project, I looked at my practice as a teacher and where I would like to improve/develop my skills. What I often found difficult in my setting was being able to maintain engagement throughout learning activities. This wasn't something that happened with all pupils and at all times, however it was something that I was able to highlight as an area I would like to improve on.

As previously stated, I work in a secondary SEN setting with pupils aged 16-19 years. Within my class there are 8 pupils with differing needs, abilities and diagnoses. Amongst those 8 pupils there are 3 in particular who often struggle with maintaining focus and engagement throughout teaching and learning activities.

Figure 10.

Pupil F	Female with Global Developmental Delay. She quite often finds it difficult to remain focused throughout the day. She has a very active imagination which quite often distracts her.
Pupil I	Male with Down's Syndrome. He finds it difficult to maintain focus during teaching and learning activities as he does not find them overly motivating.
Pupil V	Male with ASD. He has quite high sensory needs. He will often rush through his work without much thought and stand up/remove himself to regulate by either running up and down the classroom or using sensory toys/resources.

I have highlighted these 3 pupils as they are all very different in who they are as individuals, however they all have difficulties in the same areas of engagement and focus. As I already had an understanding of sensory integration and some of the benefits of using sensory-based activities, I wanted to explore if using them in a structured way could support these pupils, as well as the other pupils in my class, in developing their abilities to engage.

I feel Action Research is appropriate for this study as the whole aim of the process is to investigate ways to improve practice and ultimately this is what I am trying to achieve in regards to pupil engagement. Following the Action Research cycle by identifying the problem area and planning how best to get results, implementing that plan, observing and reflecting on the process to make next steps, I will hopefully achieve the aim of improving my practice. Or at the very least be better informed when it comes to making decisions about my future teaching practices.

Ethical Considerations

There can be many ethical and political issues that can arise when carrying out an Action Research Project. The biggest consideration to have is to do with consent, not only by those involved in the project but by the organisation the project will be undertaken in. For this Action Research Project I obtained permission from the Autism Lead in my organisation to undertake research and collect data during my hours of work whilst abiding by the organisation's Safeguarding Policy. A copy of this permission is attached in Appendix 2.

As I was going to be collecting data from staff (in the form of surveys) and pupils (in the form of observations), it was imperative that I collected the appropriate permissions. For staff surveys, they were informed that it was voluntary and their personal information would not be shared in the project. All the information gathered would remain anonymous and by completing the survey they agreed to this.

In regards to pupils, parent permission was obtained. The abilities and needs of the pupils in my class are varied and the content of the project is not something any one of them would have the ability to accurately comprehend, so their parent/guardian consent was required. This was collected in the form of a school headed letter that explained the nature and aims of the project. It also reinforced that all information would remain anonymous and that each pupil would not be identifiable in any way. A copy of this letter is attached in Appendix 3.

Although the pupils were unable to accurately understand the project, I still required their consent to take part in the activities. Each day the Sensory Circuits were implemented, pupils were given the option to sit it out and on occasion this was the choice of one or two of them. This was due to either lack of energy (as it was always implemented first thing in the morning) or at times a preferred choice due to their mood. On these occasions, there was no data collected for those individual pupils.

Initial Planning and Intervention Strategies

For this Action Research project I am aiming to determine if implementing sensory-based activities prior to learning will improve levels of engagement during teaching and learning activities. To do this I will be running Sensory Circuits with my class.

I have to determine how I am going to collect the necessary data and if it will be quantitative, qualitative or both. For the purposes of this project I will use mostly qualitative as a lot of the data will be based on my observations which will be recorded on The Zones of Regulation recording sheet. However, it will be a somewhat mixed approach as I will also be using a spreadsheet of my observational findings and producing staff surveys that will give a quantitative result. To analyse the data, I will be able to write up my observation findings and also check the statistical results of the surveys to determine whether there has been any improvement. The reason I have chosen to use observations as my main method of data collection is due to the nature of the pupils I work with. As they all have varying needs and abilities, it can be difficult to get information from them in the form of surveys/questioning. This can be down to limited communication skills and/or their want/desire to answer in the 'correct' way rather than giving an honest response to a question. I also chose to do a staff survey around using sensory-based activities to obtain some awareness of the level of use of sensory activities across the school. My hope is that the results of this project will support the teachers and support staff in my organisation to better understand the benefits of sensory-based activities and their effect on learning.

Initially when writing my proposal for this project, I had the aim of implementing my intervention strategies with 2 groups of pupils. This would allow for broader research to be undertaken and hopefully more accurate findings. However, since then COVID-19 has become a challenging factor and we were no longer permitted to mix with others outside of our classroom 'bubbles'. This meant that I could now only run the interventions with my group of pupils. As previously mentioned, there are 8 pupils of varying abilities in my class. Ideally I would have liked for them all to be involved, however 1 of those pupils only attends school part-time and when she does attend she starts later than when the interventions are planned for. So for this project, I will be using the data collected on 7 pupils in my class. I will also have 2 other staff members (3 including myself) that will be running the Sensory Circuits.

To minimise the risk of bias in this project, I need to ensure that I keep as many elements as possible the same. If there are changes to any of these elements, it can greatly affect the outcome as it will be difficult to determine if a result is due to the individual or to their reaction to a change. Below is a list of things I plan on doing to help minimise the risk of bias:

1. **Environment** - this will remain the same and will be my classroom. All pupils are familiar and comfortable with the space.
2. **Start time** - this will remain the same every day and will be the first thing after pupils arrive.
3. **Resources -** any physical resources and staffing will remain the same as this will ensure pupils are aware of what to expect.

4. **Structure** - this is really important to keep the same as previously mentioned, Sensory Circuits are only effective if they are completed in the correct order.

In order to begin carrying out my research, the first thing I did was organise a meeting with the school based Occupational Therapist. I posed the idea for my Action Research project and she thought it is an area that is not yet fully appreciated or understood in our setting so she was very willing to support me with this. We discussed Sensory Circuits and she was able to give me real life examples of her own experience in using them, both in and out of our setting. This was helpful as I had never implemented one before and she had agreed to support me in running the first one.

The very first step in starting this process was to obtain the permission from my organisation as well as the permission from parents/carers of pupils. The data collected and the information on pupils and staff presented in this project is anonymous. As previously mentioned, a copy of the permission from my organisation can be found in Appendix 2 and a copy of the letter sent home to parents/carers can be found in Appendix 3.

Before being able to carry out the Sensory Circuit interventions, I had to determine how long I would need to gather enough data in order to see results. I decided on using the length of a half term, which was 6 weeks in total. This was to be split in to the following:

Week 1 - Baseline pupils

Weeks 2-5 - Implement Sensory Circuits

I felt this time frame was adequate as it also allowed an extra week at the end of the half term for any extra data collection if needed.

The next step was to plan how I would baseline pupils. For this I decided to do 3 different observations.

1. Using the Zones of Regulation recording chart, monitor the moods and alertness of pupils each morning before the start of the day. This would give me a starting point to see how they present prior to any intervention strategies put in place.
2. By taking notes I would monitor their responsiveness during a group morning discussion which happens at the start of each day. I would check for two things: were they responsive to questioning and could they recall any information from the discussion. I would then present this in a spreadsheet using a bar graph.
3. Again using the method of note taking I would monitor if pupils were able to complete the first piece of work they were set for the day. This would happen directly after the morning discussions. I would again present this in a spreadsheet using a bar graph. This would give me an insight into their levels of engagement during written work.

It is important to get these baselines of pupils as it would give me a starting point and would allow me to see where progress was made and with which pupils.

I would then use these same methods to record the data during weeks 2-5 when I will be implementing the Sensory Circuits.

1. Using the Zones of Regulation recording sheet, I would monitor pupil moods/alertness both BEFORE and AFTER implementing the Sensory Circuits. This would help me to understand if there were any changes as an immediate and direct result of the intervention.
2. As above - note taking during group morning discussions that would happen directly after the Sensory Circuits.
3. As above - note taking to monitor if pupils completed written work that would happen directly after morning discussions.

The use of these three methods of data collection will give a broad understanding of whether implementing sensory-based activities improves levels of engagement during teaching and learning activities.

Once I had decided on how I would put my Action Research project into practice, I had to determine what resources I would need. For data collection I would need copies of the Zones of Regulation recording sheet and my own note taking resources. However, for the Sensory Circuits I would have to decide which activities would be done during them in order to determine which resources would be required. Below is a description of the selected activities and the necessary resources.

Figure 11.

	Activities	Resources
Alerting Stage	- Clap and stomp - Ball bounce - Jumping	- Large exercise ball - Mini trampoline
Organising Stage	- Ball and net - Walk the line - Puddle jump	- Small basketball hoop and table tennis balls - Long piece of string - 'Puddles' laminated pictures
Calming Stage	- Pull and stretch - Calming music	- Stretchy resistance bands - Computer/music system

The resources above were all available to me either because I had them already, I could create them easily enough or they were borrowed to me by the Occupational Therapist. I would also require a digital timer to keep track of time spent at each station and to indicate to pupils when they were to move on to the next activity.

As well as conducting my own research and implementing these strategies, I wanted to get an overview of the use and understanding of sensory-based activities across my setting. In order to do this I devised a staff survey that was shared with teachers. The survey comprised of the following questions:

1. Do you feel confident in your own understanding of the sensory based needs of your learners?

2. Do you implement any sensory activities within your classroom?

- If not, please indicate the reason/s why. Select all that apply to you: I don't have the knowledge, I don't have the resources, I don't have the time, I don't think it would be relevant/beneficial to my learners, other.
- If yes, please indicate the types of sensory activities you implement. Select all that apply to you: Sensory Circuits for individuals, Sensory Circuits for groups, Sensory Programmes (Diets) for individuals, Sensory play (free play using sensory toys/equipment), other.
- If yes, what time/s of the day do you implement them?

3. What benefits or challenges do you notice from implementing sensory activities in the classroom?

4. Would you like more information about sensory-based activities to support you/your class?

- If yes, what would you like to know? Select all that apply to you: What are some of the different types of activities? What is a Sensory Circuit? How can I implement sensory-based activities into my day? What are the benefits? I would like CDP training. I would like in house training from the OT/other professionals.

The results of the survey will be explored later within Conclusions and Findings.

Having completed my initial planning and organising my intervention strategies it was time to begin with the Baseline of pupils.

Week 1 - Baseline

Prior to implementing Sensory Circuits with my class, I baselined each pupil to give me a starting point. This would allow me to determine whether the interventions were making a difference/improvement. As previously mentioned, in order to carry out my baseline I used three methods:

- Recording moods/alertness using the Zones of Regulation recording chart.
- Taking notes on responsiveness during group discussion.
- Monitoring work completion.

Zones of Regulation - Moods/Alertness of Pupils

I used a blank copy of the Zones of Regulation recording chart to monitor pupil moods, levels of alertness and emotions first thing when they arrived at the classroom each morning. This was done as a general observation of how they presented in regards to their behaviours as well as with questioning about their moods. Again, to give context to the four Zones the below table outlines the types of moods/alertness levels for each coloured Zone.

Figure 12.

Blue	Green	Yellow	Red
Sad	Happy	Worried	Overjoyed/elated
Bored	Focused	Frustrated	Panicked
Tired	Calm	Silly	Angry
Sick	Proud	Excited	Terrified

I monitored each pupil every morning for one week and the results are as follows:

Figure 13.
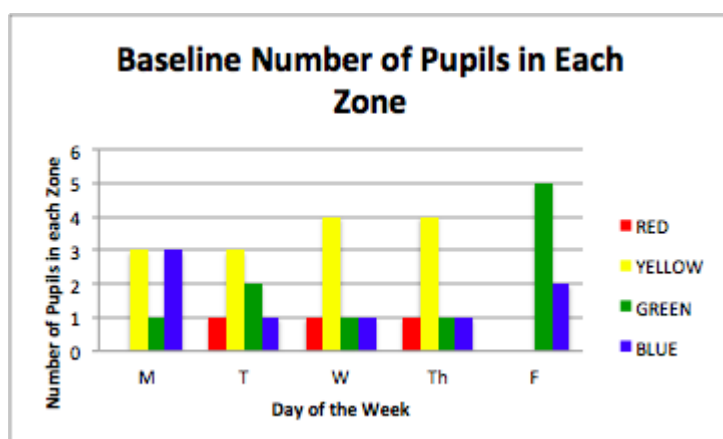
This graph shows the number of pupils in each different Zone for each day of the week. What I found interesting was the number of pupils in the 'Green Zone', which equates to being focused, happy and calm, had increased overall by the end of the week on a Friday.

This could be a result of a number of things, from excitement for the weekend or feeling calm and focused after a week of routine.

To give a complete weekly overview of the moods/levels of alertness/feelings of pupils the following pie chart was created using the data in the above bar graph.

Figure 14.
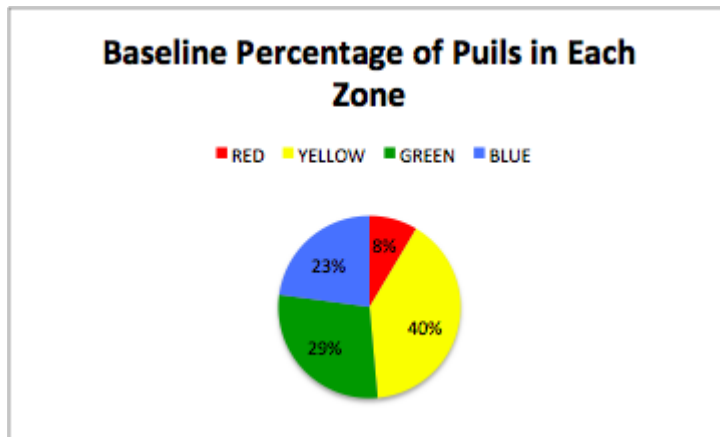
The 'Green Zone' is ideally where I would like pupils to be. This shows they are ready to learn and happy in their environment and was evident 29% of the time during this baseline week.

As is evident in the chart above, pupils were in the 'Yellow Zone' for the majority of the week. This showed that they were predominantly feeling unfocused, excited, worried etc. From my observation notes, the overall atmosphere was of excitement. I am fortunate to have a group of pupils in my class who predominantly enjoy coming to school. I feel this data supports that conclusion.

It is not realistic to expect all pupils to be operating at the optimum every day, as it is not realistic to expect yourself or anybody else to. There will be days where pupils will be operating in the 'Blue Zone' and 'Red Zone'. During this baseline week, the percentage data of pupils in the 'Blue Zone' was predominantly the result of one pupil, Pupil K. She quite often arrives at school slightly later than her peers and struggles with sleep during the night so is lethargic and tired at the beginning of the day. Monitoring her progress throughout this project it will be interesting to see how she responds to the implementation of Sensory Circuits.

The percentage data of pupils in the 'Red Zone' again was predominantly the result of one pupil, Pupil I. I mentioned this pupil previously in Figure 10 - Male with Down's Syndrome. He finds it difficult to maintain focus during teaching and learning activities as he does not find them overly motivating. As well as this, he finds it difficult to move on from a situation that has caused him distress or to be upset. During this baseline week it was a result of a trigger that happened at home which he then carried with him for a few days. This is not uncommon for Pupil I and again will be interesting to see if this happens during the implementation of Sensory Circuits and if they have a positive effect on him.

Morning Discussions - Responsiveness of Pupils

Each morning as a class we collectively have a morning discussion. This is to support communication and interaction skills as well as to do a check in with each other. When collecting baseline data for this, I was observing while note taking when pupils were taking part in their discussions.

I focused on two things when making my observations:

1. Were pupils responsive to questioning?
2. Could pupils recall any information from the morning discussions?

I presented the data in a spreadsheet and was able to analyse it using bar charts and pie graphs. The results are below:

Figure 15.
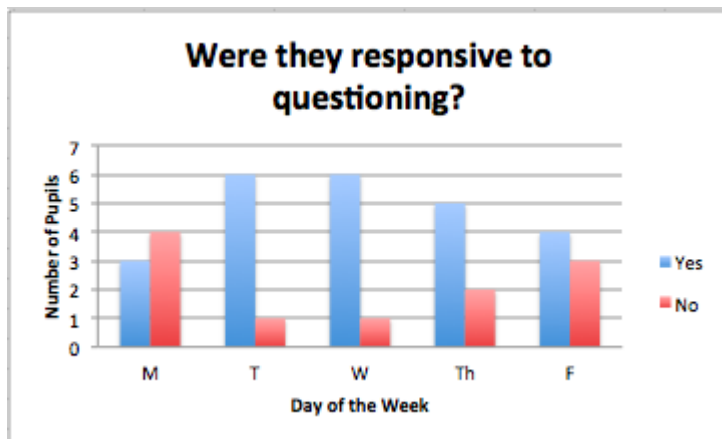
This graph shows the number of pupils who were responsive to questioning on each day. The middle of the week (Tues-Thurs) shows the highest number of pupils being responsive, whereas Monday at the beginning of the week shows the lowest number. This could be attributed to it being post weekend and pupils were not quite back into the routine of school for the week yet.

To give a complete overview of the week, the following pie chart shows the results as percentages.

Figure 16.
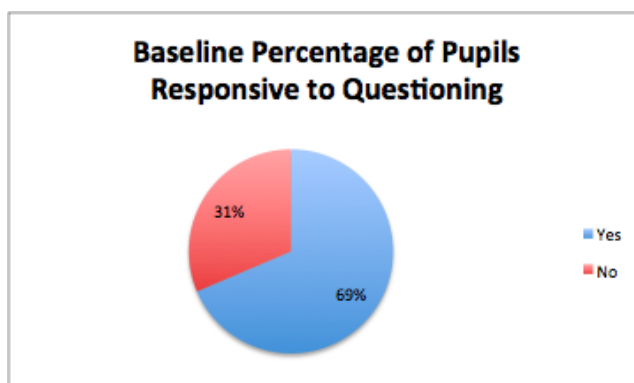
It is clear that for more than half of the time being observed, pupils were responsive to questioning during morning discussions. Statistically this is an adequate result for the nature of the learners in my class in that they each have difficulties with their communication abilities.

The following graph and chart shows the number of pupils who were able to recall information each day.
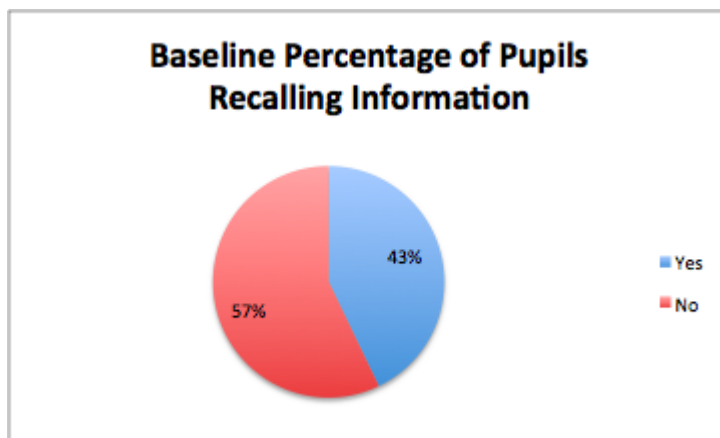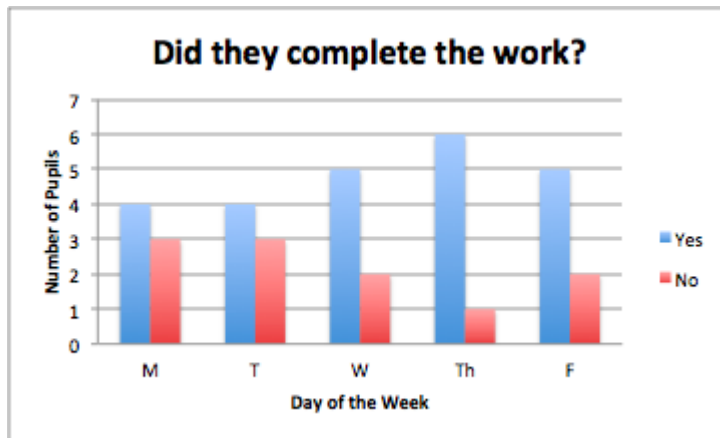
Figure 17.
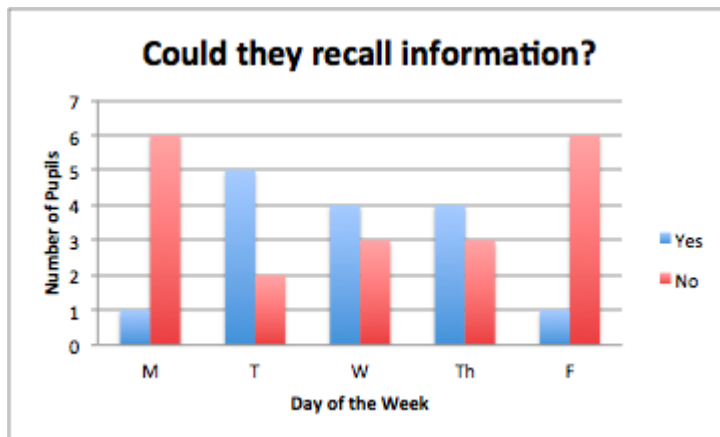
Figure 18.

The ability to recall information is a more difficult communication skill to have, so the numbers in the data are not surprising to me. Most of my pupils are not functioning at this level of communication and need a lot of scaffolding to support them when recalling information. I will be curious to see if the data shows a rise in the percentage of 'yes' results after implementing the Sensory Circuits, or if it will have little to no effect at all.

Work Completion

The last area I focused on with my data collection was written work completion. Each morning after the discussions, pupils would take part in a small writing exercise. We call it 'journal writing' and this usually consists of simple questions, spelling and reading tasks. The tasks differed slightly each day but remained the same each week. For example; every Monday was the same task, every Tuesday was the same task etc. After collecting the pupil work samples I took notes and the results were again analysed using a bar graph and pie chart.

Figure 19.

The above graph shows an increase in work completion towards the end of the week. This could be a result of pupils understanding what is expected of them and getting on with their tasks.

Figure 20.
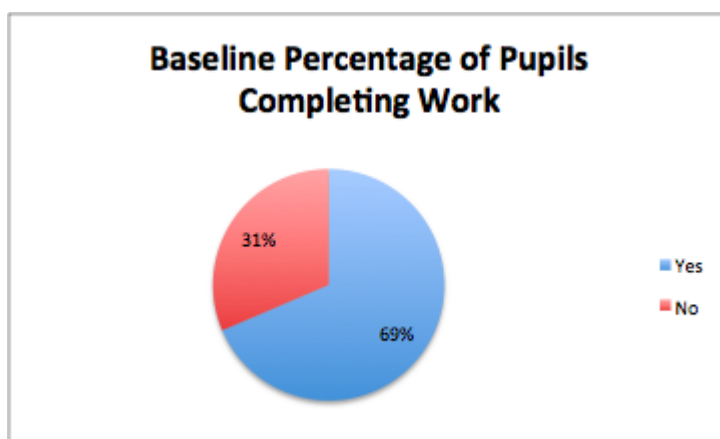
The percentage of work completion amongst pupils for the week is relatively high with slightly more than two thirds of them completing the work. I would like to mention here that 100% of pupils made an effort at completion and out of the 7 pupils observed, only 1 really struggled to put the effort in.

With all the baseline data collected and analysed, it was time for me to begin implementing the Sensory Circuits and start gathering the data to determine whether implementing sensory-based activities prior to learning increases levels of engagement in teaching and learning activities.

Weeks 2-5 - Implementation

To implement the Sensory Circuits, as discussed and planned with the Occupational Therapist in my setting, it was decided to put pupils into smaller groups.

The pupils were put into three groups:

- 1 x group of 3 pupils
- 2 x groups of 2 pupils

A staff member to support accompanied each group of pupils. Throughout the 4 weeks these groups remained the same, as did the staff member supporting them.

The Sensory Circuit was arranged the following way:

1. Three Alerting Stages - 1x ball bounce on the exercise ball, 1x trampoline jumping, 1x clapping hands and stomping feet to a rhythm (clap, clap, clap, stomp, stomp, stomp).
2. Three Organising Stages - 1x walking the line across a piece of string on the floor, 1x "puddle" jumping - two feet together jumping on each puddle, 1x ball and net - throwing table tennis balls into a small basketball hoop.
3. Two Calming Stages - 1x using stretchy resistance bands to pull independently using both hands, 1x calming music and deep breathing.

For the alerting and organising stages, the pupils completed 1 minute of each activity in their group before moving on to the next activity within that stage. Once each group had completed the Alerting Stage, they would then move on to the Organising Stage. After these first two stages were complete, all pupils came together at their desks and completed the Calming Stages as a whole group.

Using the Zones of Regulation recording sheet, I was able to monitor pupil moods/alertness both BEFORE and AFTER implementing the Sensory Circuits. A copy of one of my recording sheets is shown in Appendix 4.

As well as monitoring the Zones of pupils before and after, I tracked their engagement levels in teaching and learning activities. The first activity I tracked was the morning group discussions, these took place immediately after the Sensory Circuits. I monitored whether pupils were responsive to questioning and whether they were able to recall information. The last activity I tracked was pupil written work and whether or not they were able to complete the tasks. This activity took place immediately after the morning discussions. The data from all of these observations is shown below:

Week 2

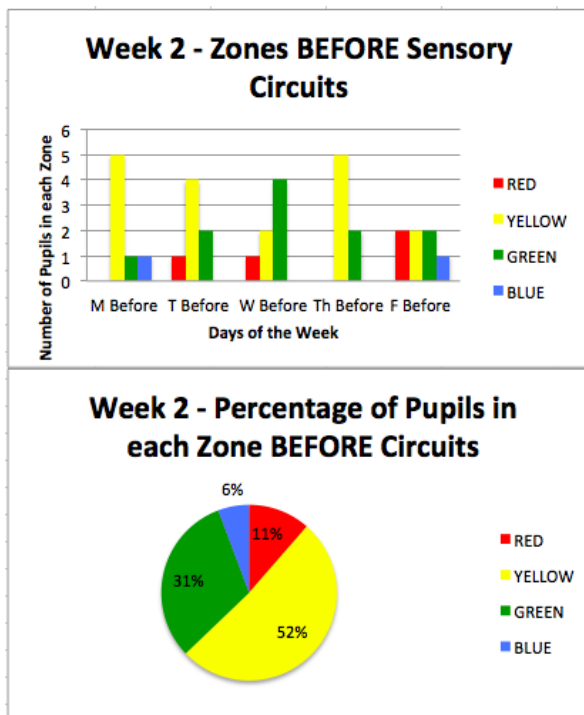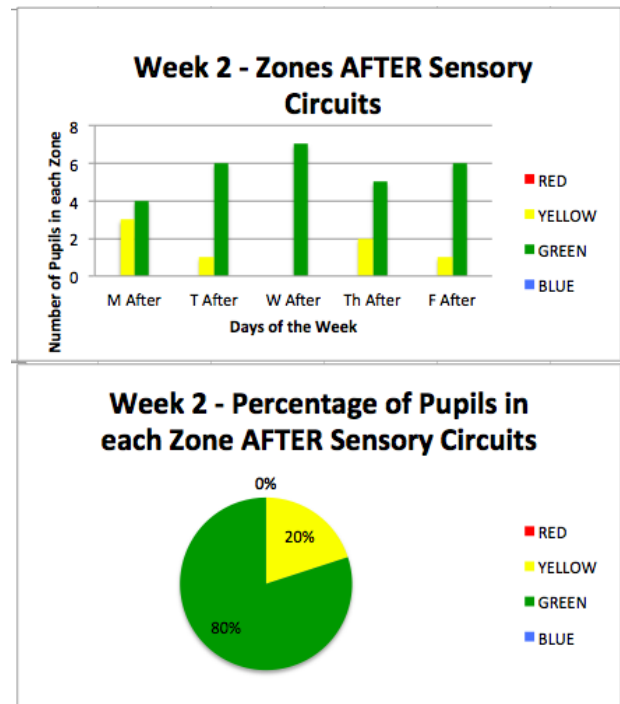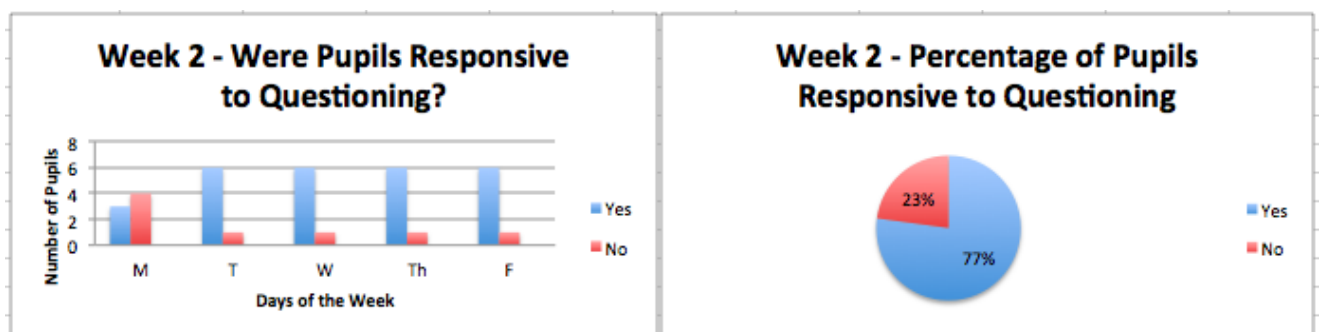Figure 21. and 22.   Figure 23. and 24.

This data shows a clear increase in the number of pupils in the 'Green Zone' after the Sensory Circuit took place. This data was quite encouraging as it showed the implementation of sensory-based activities supports pupil moods and levels of alertness.
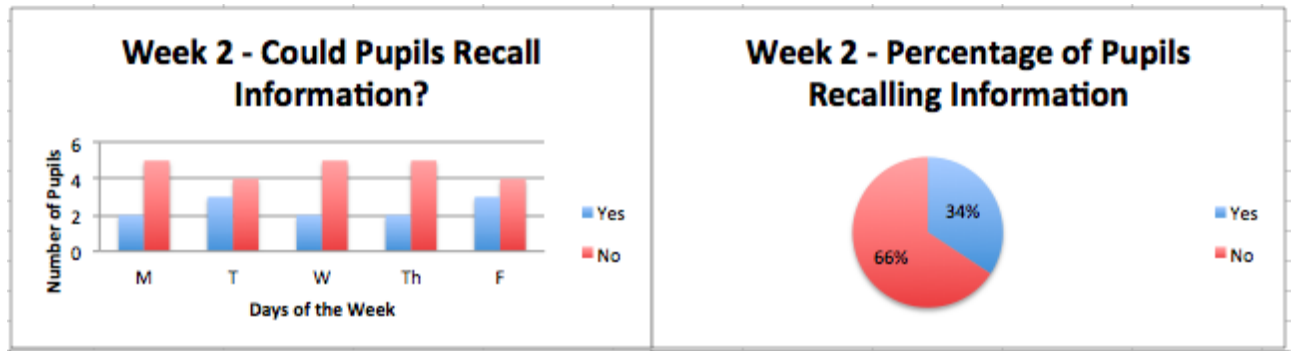
Figure 25. and 26.

The data above shows quite a high percentage of pupils being responsive to questioning. Interpreting this in comparison to the Zones results in Figures 23 and 24 show the data compliments each other in that levels of alertness support pupil abilities to respond to questioning.

Figure 27. and 28.

Although pupil responsiveness was quite high, the percentage of pupils recalling information was much lower. As previously mentioned, this is a more difficult communication skill and most pupils in the group have difficulties in this area.
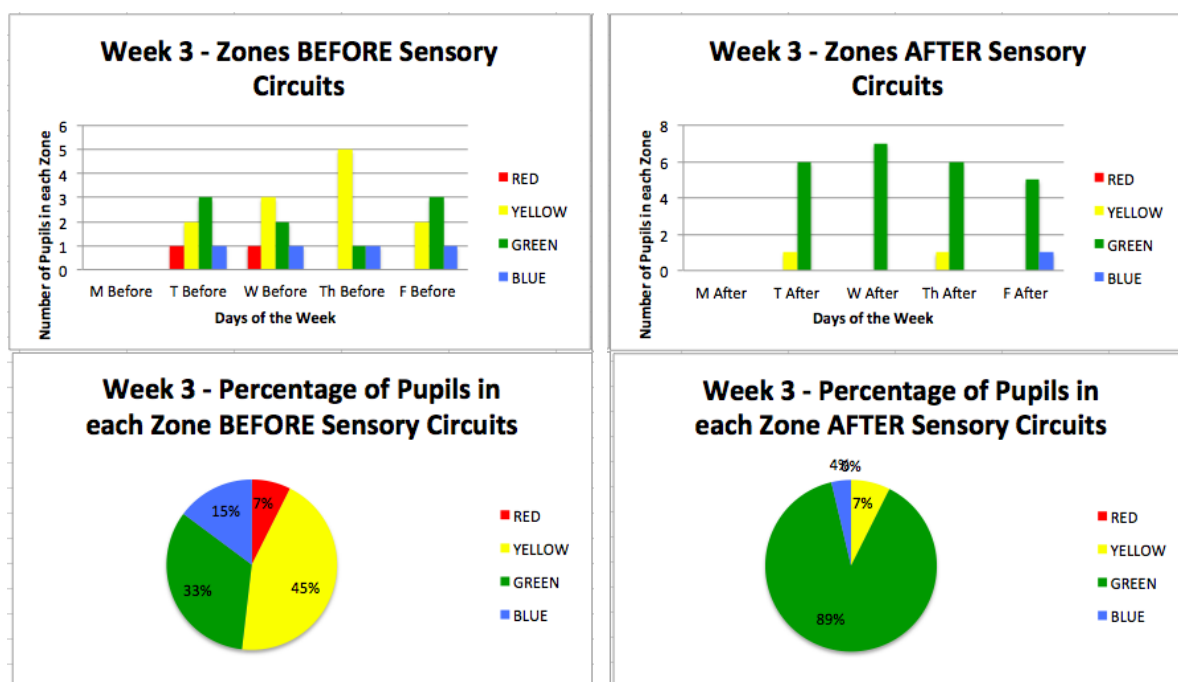
Figure 29. and 30.
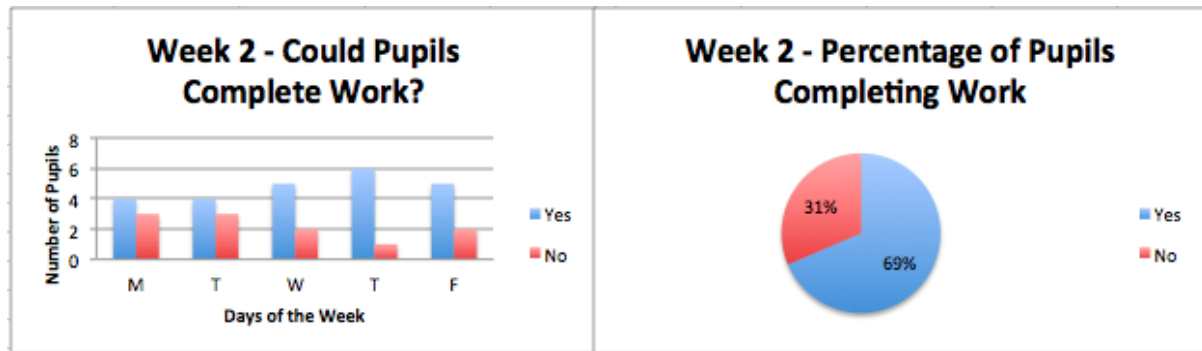
The data above shows no improvement from the initial baseline in Week 1 in Figure 20. Both weeks showed a percentage of 69% of pupils being able to complete work that was set immediately after the morning discussions.

Week 3

During Week 3 there was no data collected on Monday as it was a Bank Holiday.
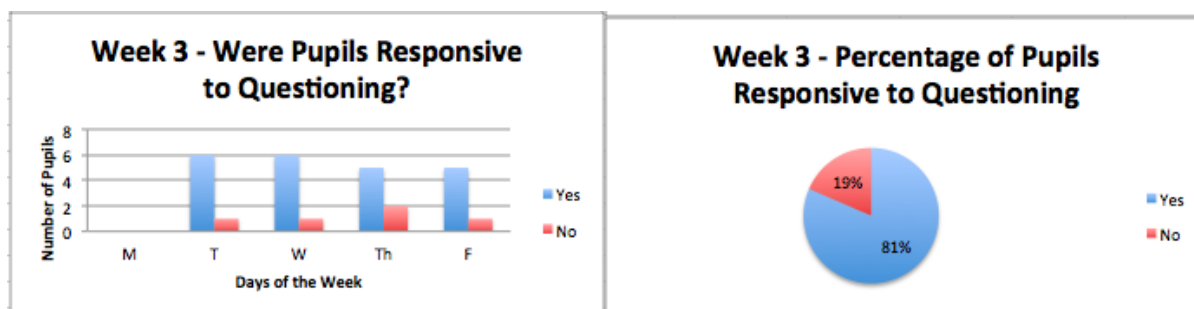
Figure 31. and 32.   Figure 33. and 34.

The data for this week shows an even bigger increase in the percentage of pupils in the 'Green Zone'. As well as in Week 2, this week showed a significant decrease to 0% of pupils in the 'Red Zone' post Sensory Circuits.

Figure 35. and 36.

Again, the percentage of pupil responsiveness to questioning complements the percentage of pupils in the 'Green Zone'.

Figure 37. and 38.
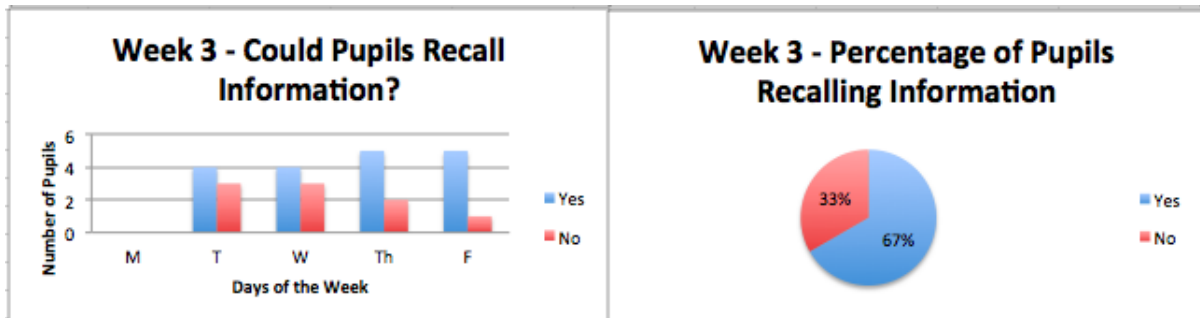
This data was quite promising as it showed a significant increase in the percentage of pupils being able to recall information. The previous week (Figure 28.) showed only 34% of pupils being able to recall information. This week the number almost doubled and gave me reason to believe the implementation of Sensory Circuits were having a positive effect.

Figure 39. and 40.
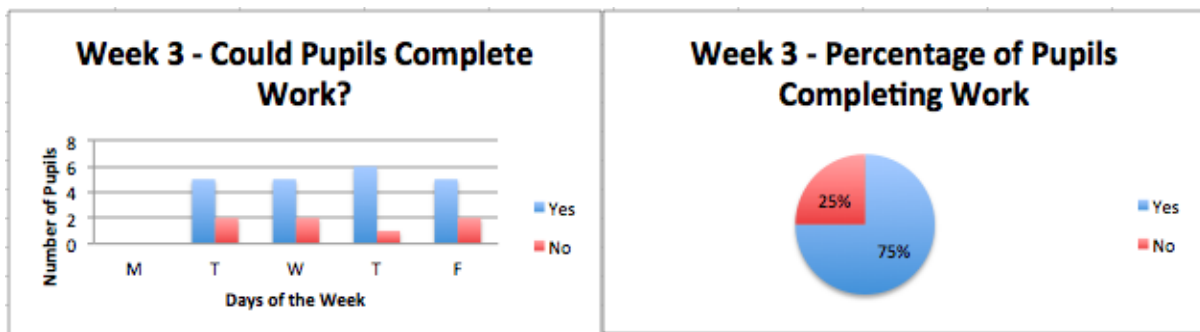
This week shows an increase in the percentage of pupils being able to complete work. The previous week showed a percentage of 61%. This week shows an increase of 15% which is a positive indication that pupils are beginning to respond well to the Sensory Circuits.

Week 4

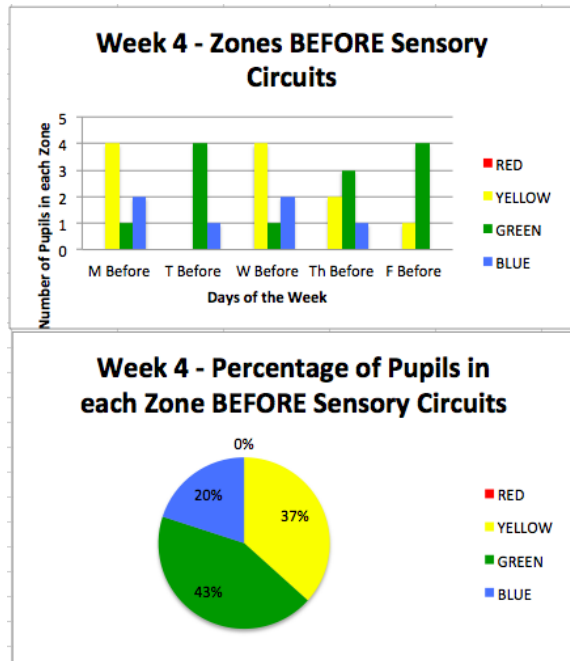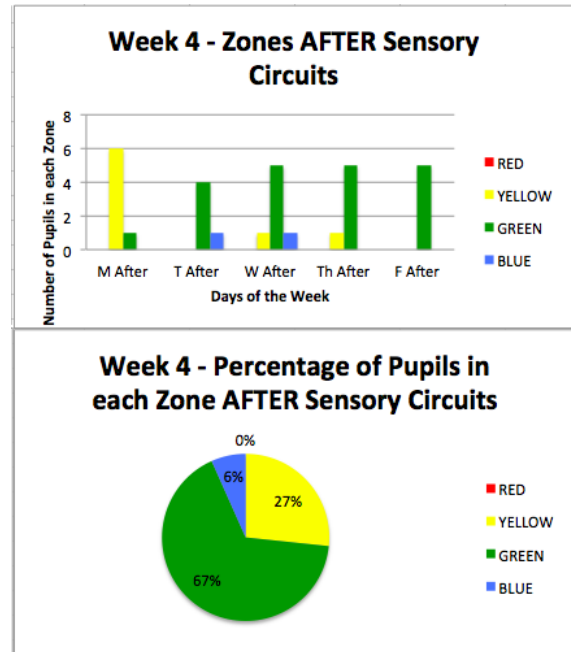Figure 41. and 42.   Figure 43. and 44.


The most notable piece of information I gathered from this set of data was that even prior to the Sensory Circuits, there were no pupils in the 'Red Zone'. To me this showed that all pupils started their day in a relatively good mood. There was not as much of an increase in 'Green Zone' pupils, however the percentage of 'Yellow Zone' pupils was higher than the last two weeks by quite a bit. From Figure 40 it is evident that the majority of these were on Monday, which could be a result of excitement at returning to school.

Figure 45. and 46.
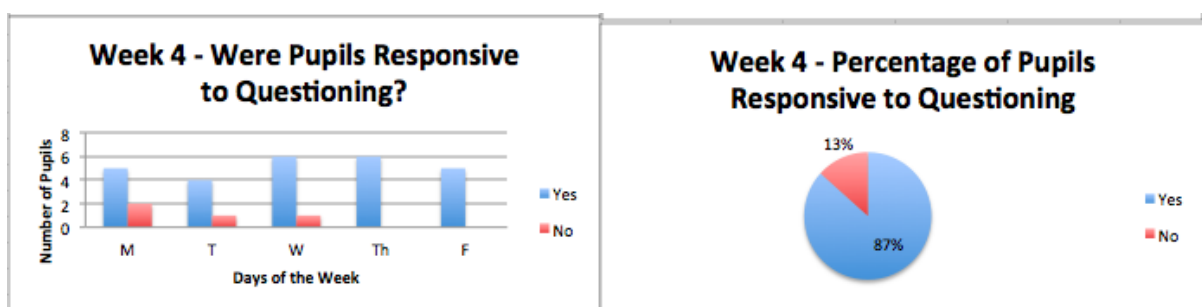
The data this week shows a continual increase in percentage of pupils being responsive to questioning during morning discussion.

Figure 47. and 48.

Week 4 - Could Pupils Recall Information?

Week 4 - Percentage of Pupils Recalling Information
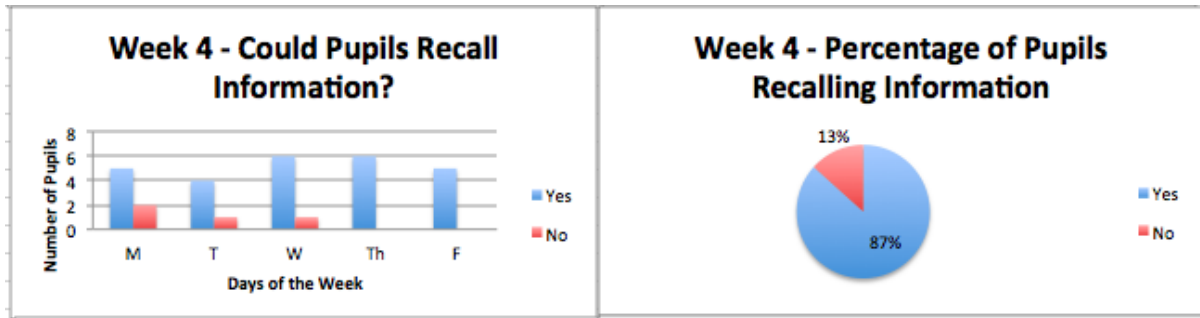
Again there has been a significant increase in the number of pupils able to recall information. This data matches exactly to the pupil responsiveness to questioning and implies the implementation of sensory-based activities is continuing to make a positive impact on levels of engagement during teaching and learning activities.

Figure 49. and 50.

Week 4 - Could Pupils Complete Work?

Week 4 - Percentage of Pupils Completing Work
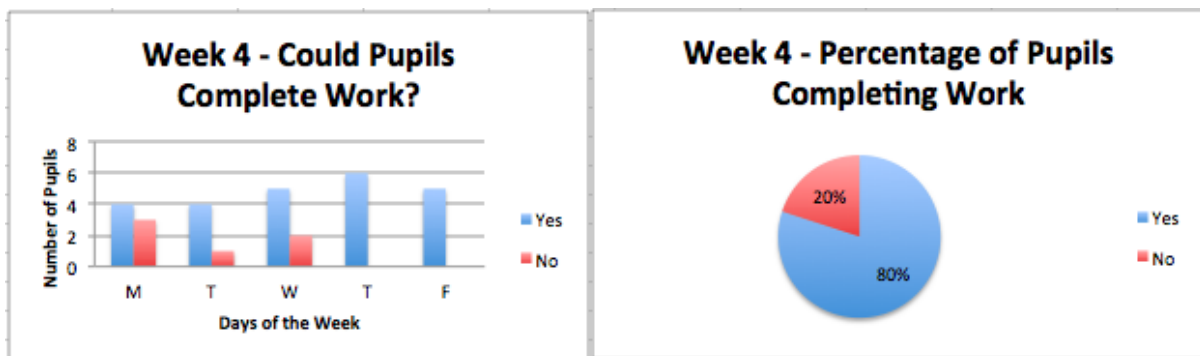
The data for this week shows a significant increase in the percentage of pupils completing work. It is up by 5% from the previous week.
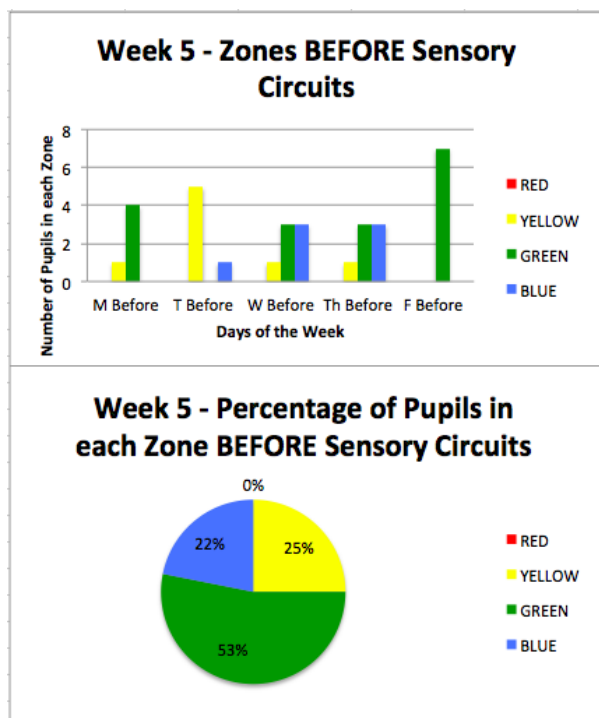
Week 5

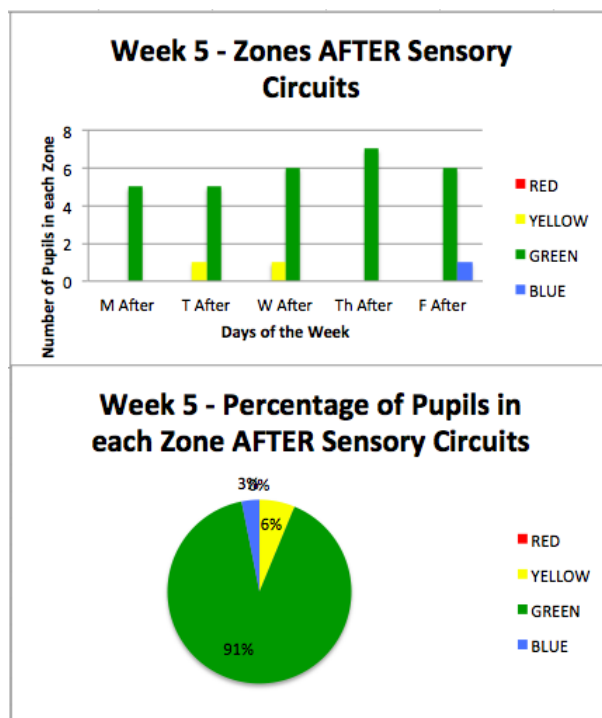Figure 51. and 52.   Figure 53. and 54.

In this final week, it showed the highest recorded percentage of pupils in the 'Green Zone' both before and after the implementation of Sensory Circuits. This indicates that overall, pupils are arriving at school in better moods and are more ready to learn. There is also an extreme decrease in the percentage of pupils in the 'Blue Zone' which is a good indication that energy levels of pupils are much higher.

Figure 55. and 56.
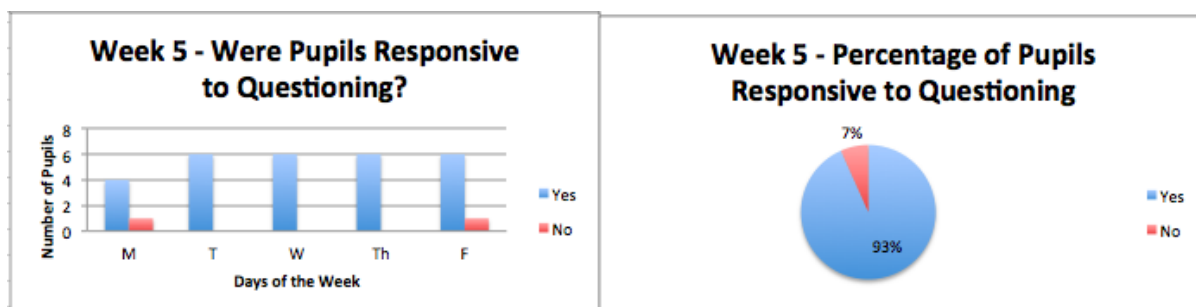
Again, this final week of data has shown the highest recorded percentage of pupils being responsive to questioning. The levels of alertness as a result of being in the 'Green Zone' support the levels of responsiveness during group discussions.

Figure 57. and 58.

Week 5 - Could Pupils Recall Information? / Week 5 - Percentage of Pupils Recalling Information
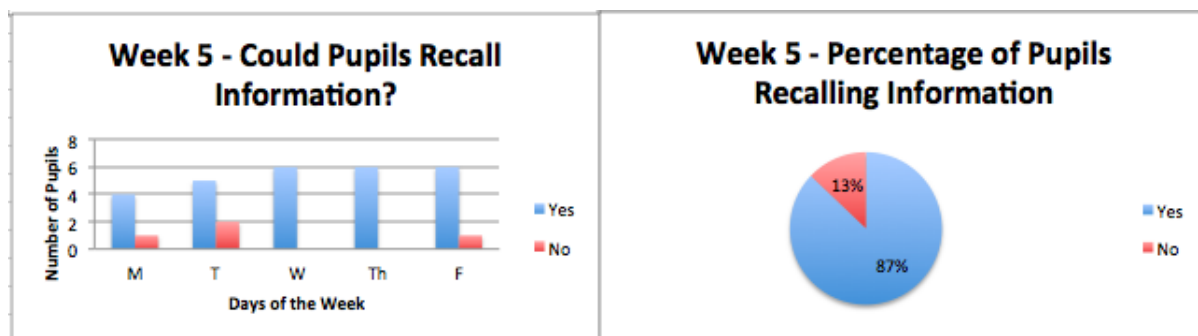
The percentage of pupils being able to recall information has increased again during the final week of implementing Sensory Circuits. This indicates the consistency of running sensory-based activities will support engagement and levels of understanding amongst pupils.

Figure 59. and 60.

Week 5 - Could Pupils Complete Work? / Week 5 - Percentage of Pupils Completing Work
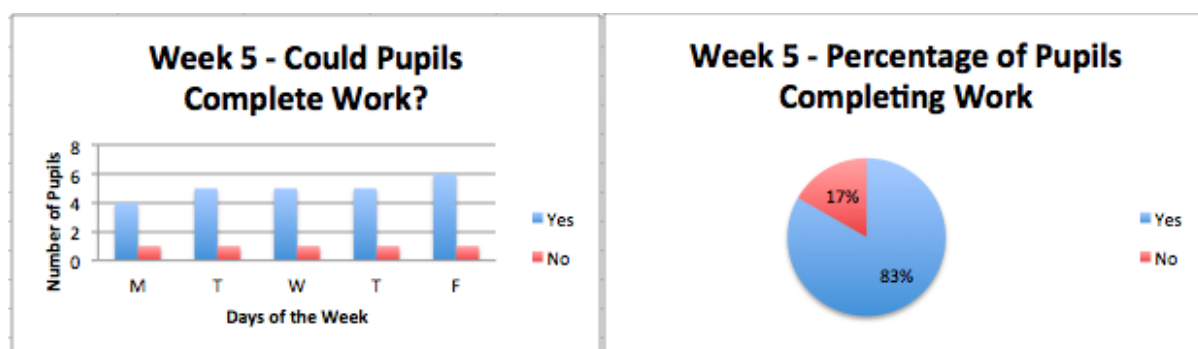
The final results for data on pupil work completion show a slight increase of 3%. Although only a small increase, it remains a positive indication that pupils are responding well to the implementation of sensory-based activities.

Conclusions and Findings

Throughout the five weeks of data collecting (week 1 being baseline) there was a significant improvement in all areas that were explored. Below is a comparison between week one and week five data to show the improvement in each area.

Zones of Regulation - Mood/Level of Alertness

Figure 61.

Week 1 Baseline vs Week 5 Implementation
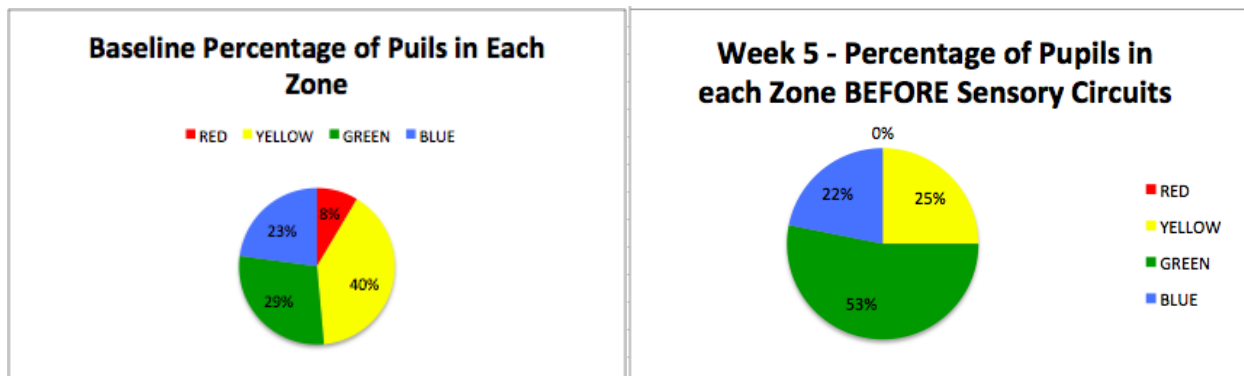
I've chosen to compare the week 5 data for
BEFORE the Sensory Circuits were implemented as it was taken at the same time of day as the baseline data, rather than comparing to the AFTER data as this could be biased. This comparison shows a clear improvement of moods/alertness levels of pupils as they start their day before implementing strategies.

Morning Discussions - Responsiveness and Recall

Figure 62.

Week 1 Baseline vs Week 5 Implementation
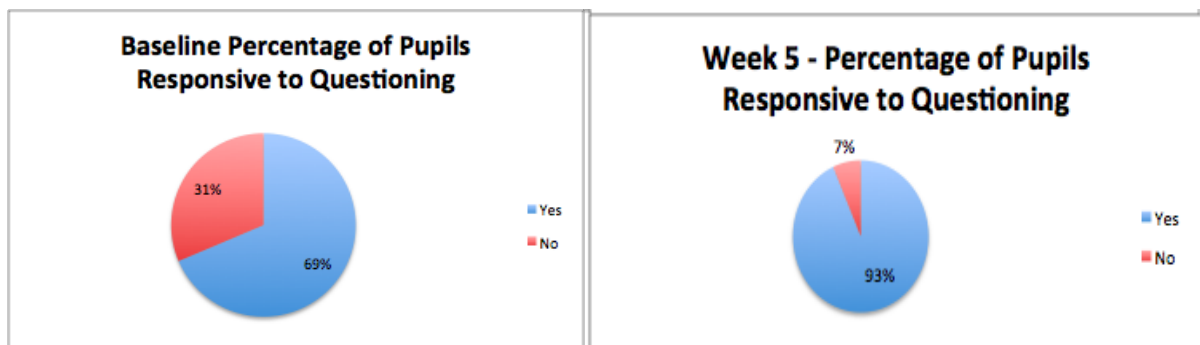
Figure 63.

Week 1 Baseline vs Week 5 Implementation
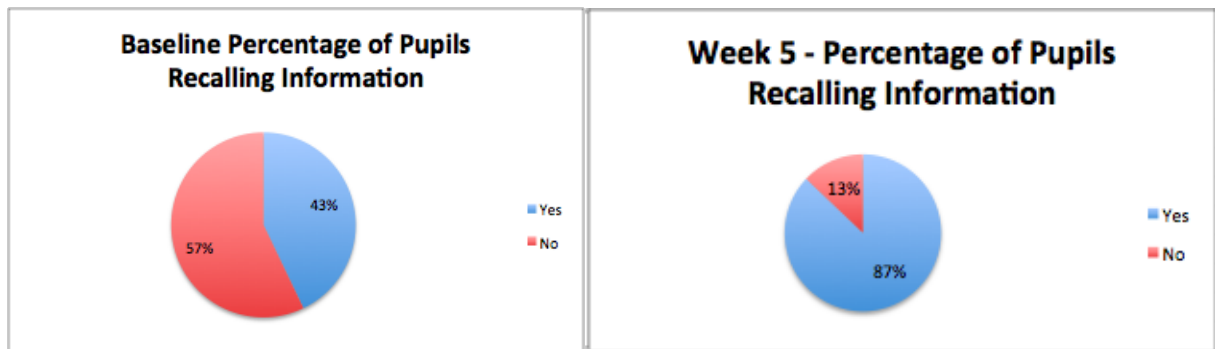
The above data shows a significant increase in both percentage of pupils being responsive and the percentage of pupils recalling information. In Figure 62, the responsiveness of pupils could definitely be attributed to the implementation of Sensory Circuits. Their overall levels of alertness had improved which in turn resulted in a higher number of responsive pupils. Figure 63 shows the percentage of pupils recalling information had doubled since the baseline week. As a result of improved levels of alertness and higher levels of responsiveness, pupil recall abilities were enhanced. The percentage of pupils who were not able to recall, was made up of individuals who have a higher degree of difficulty with communication and interaction skills so it was not all that surprising that there was not as much improvement in this area for those individuals.

Work Completion

Figure 64.

Week 1 Baseline vs Week 5 Implementation
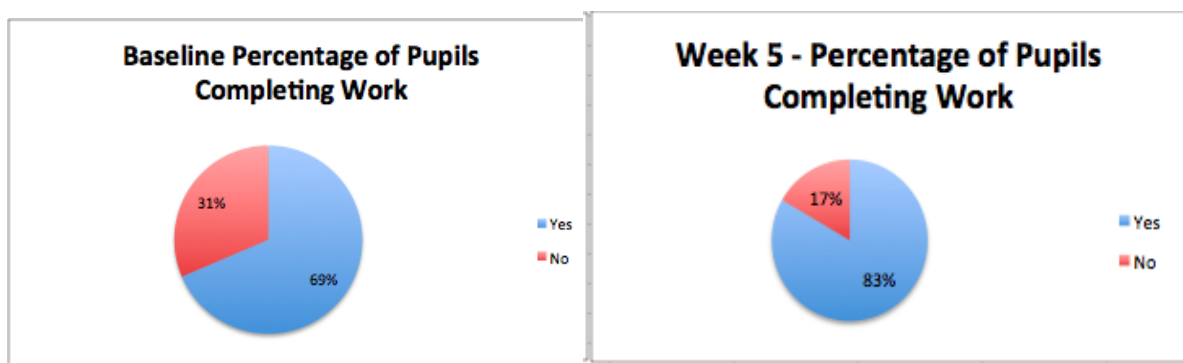
There was definitely an increase in the percentage of pupils completing work since the beginning of the project. The increase was not as significant as it has been in the other areas of research, however this was the final task being monitored each day. This could mean that by the time the written work was introduced, levels of alertness had decreased slightly.

As well as comparing the data, I wanted to reflect back on the pupils mentioned in Figure 10. These three pupils were of particular interest when implementing this project as they are most likely to struggle with attention and engagement throughout the day. To recap, the following figure shows he highlighted pupils, what they struggle with and what I observed over the course of the project.

Figure 65.

Pupil	Area of difficulty	Observation
F	Female - finds it difficult to remain focused throughout the day. Active imagination which quite often distracts her.	Improvement in her ability to remain focused during group discussion. Always engaged in Sensory Circuits. Began to lose focus during written tasks.
I	Male - finds it difficult to maintain focus during teaching and learning activities as he does not find them overly motivating.	Overall improvement in his mood. Sensory Circuits were not *always* his favourite thing to do but they resulted in improvements in his level of focus during written work.
V	Male - has quite high sensory needs, rushes through his work, removes himself to regulate.	Sensory Circuits resulted in a reduction of instances where he would remove himself to regulate. They supported his vestibular needs.

Based on the findings from this Action Research project, I can conclude that implementing sensory-based activities prior to learning does in fact improve levels of engagement in teaching and learning activities. This has at least been the case for my group of pupils. I understand that all pupils learn, engage and interact differently especially within a Special Educational Needs setting. Sensory Circuits may not work for every class or every individual in the way it has worked for my class. I have seen the benefits of it with my group of learners and would encourage others within my setting to try implementing elements of sensory-based activities throughout their day to see if it supports their learners too.

As previously mentioned, I created a survey for teaching staff to get an awareness of the use of sensory-based activities within my setting. I received 16 responses to the survey and found the results to be quite interesting. In my setting we run two curriculums; pathway 1 for pupils with more complex needs and pathway 2 for pupils with higher abilities. The teachers who took part in the survey are a mixture of both pathways. Below are some of the results from the survey:

Figure 67. - Questions 1 and 2
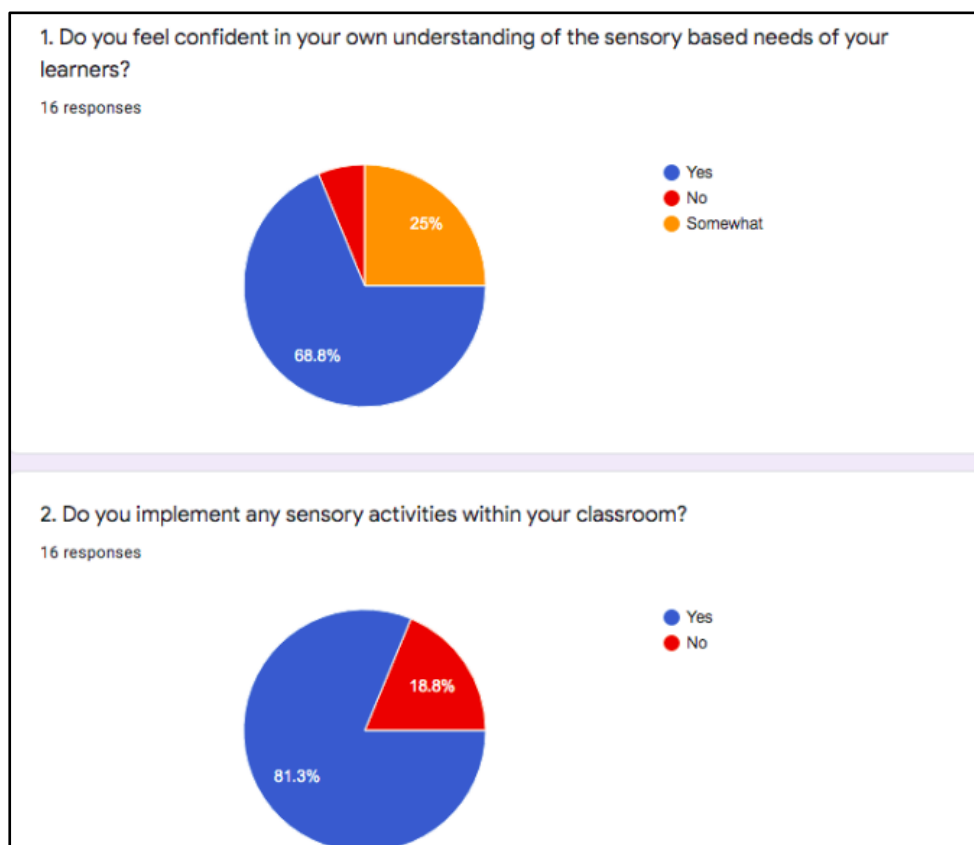
The percentage of teachers who feel less confident in their understanding of the sensory needs of their pupils as well as those who don't implement sensory activities within their classroom, were all teachers who work within the Pathway 2 curriculum. This wasn't surprising to me as the majority of the type of learners in Pathway 2 have less sensory needs than those of Pathway 1 pupils. However, this does not mean they have NO sensory-based needs and it also does not mean they would not benefit from sensory activities.

Figure 68. - Question 3
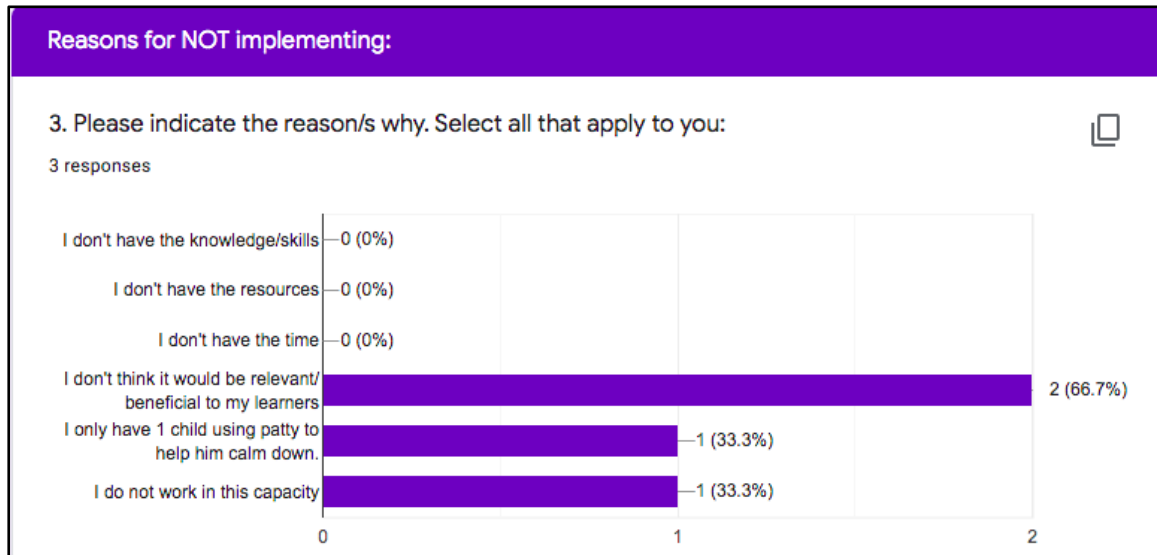
I found the results from this question to be quite interesting. 66.7% of those who answered no to question 2 said they don't feel sensory-based activities would be relevant/beneficial to their learners. Bearing in mind that this was only the response of 2 individual teachers running Pathway 2, this still accounts for at least 16-20 pupils. To me this shows that they possibly see sensory-based activities as a more Pathway 1 focus. However, from my experience and research, sensory-based activities can benefit everyone in different ways. They don't have to be Sensory Circuits or just using putty to stay calm. They can be anything from listening to music to support focus to movement breaks that let out excess energy. It is quite possible these teachers are in fact implementing sensory activities without realising it.

One of the questions in the survey asked "What benefits or challenges do you notice from implementing sensory activities in the classroom?" Some of the responses to this are below:

- "Sensory seeking behaviour decrease, more focus and settling for the day"
- "Keeps them calm and relaxed"
- "The pupils are calmer and more focused after completing their sensory circuit in the morning. Individuals have regular work breaks where they engage in a sensory activity for 2 minutes and once back to work, they are focused again. Individuals also have sensory input throughout the activity, for example: putty and fidget toys which helps the pupils keep focused."
- "reduced sensory overload is a benefit, replacing ordering finding equipment is a challenge "
- "Students are sometimes better able to respond to learning situations in class, they are woken up by the activities. However, some do tire from this, especially since the

Lockdown which has made a difference. We have also noticed more sensory needs and/or processing difficulties from the variety of activities we have offered."
- "Benefits: it lifts their mood. Challenges: to purchase the equipment, keep the equipment in order"

The responses to this question all seemed very similar across the board. One of the biggest challenges people have found is the access to resources. There are definitely difficulties when it comes to obtaining resources whether it be an issue with ordering and access to the budget or maintaining equipment. One thing I have learnt throughout this research project is that resources don't have to be expensive or even purchased. They can be created with what you already have available to you and they can also be shared with peers. It requires being aware of what is available in your setting already by communicating to others and asking the question.

The last section of the survey asked teachers if they would like more information about sensory-based activities to support them and their class/pupils. 68.8% of participants selected 'yes' which I found surprising given that was the exact percentage of participants who said they feel confident in their understanding of the sensory-based needs of their learners. This result is promising though as it shows that most teachers are willing to and interested in developing their knowledge around sensory-based activities. Below are some of the results of what they would like more information o:

- What are some of the different types of activities?

  This response was highly popular amongst participants.

- How can I implement sensory-based activities into my day?
- What are the benefits?
- I would like in house training from the OT/other professionals

As previously mentioned, I do believe implementing sensory-based activities prior to learning does improve levels of engagement in teaching and learning activities. The findings from the data I collected supports this and it has been an extremely interesting and rewarding process. Hopefully this Action Research project will support others in my setting to better understand Sensory Integration and the ways in which we can support our pupils with their sensory needs.

Reflection of Own Practice and Future Recommendations

As a teacher it is important to constantly reflect on your own practice. The Teachers' Standards clearly states that as a requirement we "reflect systematically on the effectiveness of lessons and approaches to teaching". (GOV.UK, Department for Education, 2011)

Reflecting on my practice since undertaking this Action Research project I have definitely been able to see the importance of incorporating sensory-based activities throughout the curriculum I teach. It has given me the opportunity to see where there are areas for improvement in not only my own practice but within the school as a whole.

As discovered through the results of the survey, there is a high percentage of teachers who would like to improve on their knowledge and skills around sensory-based learning. This is based on the number of teachers who participated in the survey, it is likely there is an even higher number of teachers in my setting who would like support in this area. Going forward, I would like to improve my knowledge and skills to support the wider school setting.

Prior to being employed as a teacher in my setting, I worked as part of an Autism Team within the school; this team consisted of myself and the Autism Lead. We would identify the pupils in the school, usually those with ASD and identify their areas of difficulty. This could be with difficulties in social interaction, communication and/or sensory needs. Pupils were then selected on a needs basis and interventions were developed to support them and the staff who worked with them. Since changing roles to being in a full time teaching position, this Autism Team no longer exists however there is still a demand for something like it within the school.

I would like to restart this team with the support of both the Autism Lead and the Occupational Therapist (OT) in my school. The aim would be to support teachers by giving them training and information on Sensory Integration, Sensory Processing difficulties and Sensory-Based activities. Ideally interventions could be set up again, whether that's as a group in different classes or with individuals. As I do not have all the knowledge and skills yet so this would take more research and a lot of collaborating with the OT to support this proposal. I have already previously had a discussion with the Autism Lead about this idea and she has agreed that it could definitely be of benefit to the school. It would take a lot of planning and a shift in my responsibilities as a teacher, however I feel it would be highly valuable to my school.

Reflection of Action Research

Initially I had minimal knowledge on Action Research and what it is used for. Since starting this project I have gained a good understanding of the process and have found that it has been an effective method of research. I have been able to follow the model of Action Research in order to answer my initial question and reflect on my own teaching practice. As previously discussed, the Action Research cycle is divided into at least 4 stages.

1. Planning
2. Acting
3. Observing
4. Reflecting

I feel one of my biggest areas of strength was in the planning stage. The initial meeting I had with the Occupational Therapist was hugely beneficial as it allowed me to gain her perspective on the proposal. As Sensory Integration is closely linked to the field of Occupational Therapy, her knowledge on the topic was extremely valuable to me.

The Acting stage was the most difficult for me as it was the most time consuming. This meant that I had to ensure I was extremely organised with all other areas of my teaching day as time was taken each morning to observe and take notes. Although it was a challenge, it was definitely achievable and ultimately gave me the results I was hoping for.
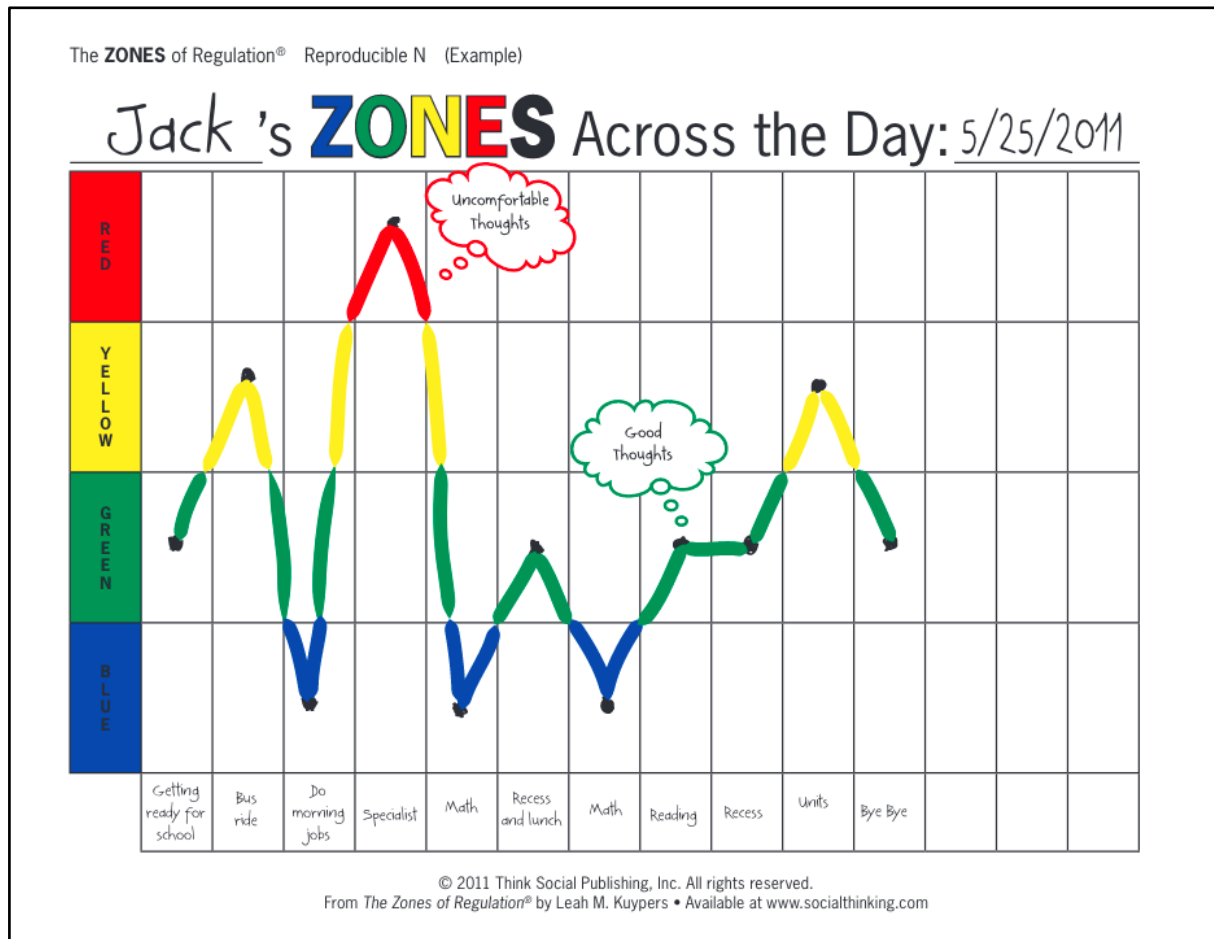
Observing was also a very time consuming process. There was a lot more data to analyse than I initially thought there would be. However, I am grateful that there was so much data as it supported the proposal and made it easy to decide on what I could do going forward.

I found the Reflecting stage the easiest as the amount of data that was analysed really highlighted how sensory-based activities can support pupils during teaching and learning activities. It also showed where there was a lack of knowledge and understanding of the topic, which will hopefully give me the opportunity to support in developing that both within the setting and myself.

Overall, the Action Research process was highly beneficial and I would definitely use it again to better my teaching practice. If I was to use this method of research again I would be better equipped with the knowledge of the process before undertaking a project and feel I would also be able to choose the best methods for data collection according to the area I choose to research. In a way, as teachers we are constantly undertaking Action Research as we are always planning, acting, observing and reflecting on our practice.

Appendices

Appendix 1.

The **ZONES** of Regulation® Reproducible N (Example)

Jack 's **ZON**E**S** Across the Day: 5/25/2011

Uncomfortable Thoughts

Good Thoughts

RED
YELLOW
GREEN
BLUE

Getting ready for school | Bus ride | Do morning jobs | Specialist | Math | Recess and lunch | Math | Reading | Recess | Units | Bye Bye

Appendix 2.

22/04/2021

To whom it may concern

Re: Amy Kemeridis Action Research

I am writing to inform you that approval for Amy Kemeridis to conduct her Action Research was given by myself the, Autism Lead and member of the Senior Leadership Team ███████████████████

Amy's proposal was to determine if *introducing sensory based activities helps to increase levels of engagement of pupils in teaching and learning activities.*

Amy considered the ethical issues involved and I can confirm that she sought and gained parental permission before conducting her research as well.

Yours sincerely

Appendix 3.

Dear Parents/Carers,

I am writing to inform you of a research project I am conducting.

I would like to determine if *introducing sensory based activities helps to increase levels of engagement of pupils in teaching and learning activities.*

In order to conduct this research I require permission from parents/carers to use the data collected. I can assure you that any data collected will be **completely anonymous** and no pupil details will be shared.

Conducting this research will be of great benefit to the class, myself as a teacher and the school as a whole.

If you could please complete the form below and return it to school with your child as soon as possible, it would be greatly appreciated.

If you need to contact me to ask any questions, you can email me at ▆▆▆▆▆▆▆▆▆▆▆ or you can phone the school on ▆▆▆▆▆▆▆ and someone in reception will be able to get the message to me.

Please do be in touch if you have any questions and I will be happy to answer them.

Kind regards,
Miss Amy

I do / do not give permission for the data on my child_____
(please circle as necessary)

to be used as part of the research project conducted by Miss Amy Kemeridis.

Signed:_____

Appendix 4.

19/5/21

's ZONES Across the Day:

	Morning Before Sc.	Morning After Sc.	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
		18/5/21		19/5/21		20/5/21		21/5/21		24/5/21		25/5/21		26/5/21		27/5	28/5
RED		I,S,D,V			I,D,J,V		I,V		V		I,J,S,D,V		V		J	V,F,S, J,I,D	V,F,S, J,I,D
YELLOW						F,J,D,S, I		K,F,S,J, I,V			S,F,J,D,I		J,D,F,I, V,K, S,J, F		
GREEN		I,S,D,J, F,K	S,D,F,J	S,F,D,J		F,J,S		I,S,D,F I,S,D,F		F,S,J		F,K			
		V	H	H	S K				F		I,D,K				
BLUE	F,K			K,F		K										

Notes:
walking – although equal adults wheezed diff natural although equal adults
F remembered hearing aid 1st time independently came late so did show

V- very calm
V- very 2nd
V- very Wednesday got goofy
v- Very hyperactive

came late
K- not well
K- not well

interrupted by fire alarm. re-started

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