

Safe Space: Addressing educational disadvantage through virtual reality

Independent Evaluation Report of Outreach in Special Educational Needs Schools

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“It made every child a scientist.”

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1 Executive summary

- This evaluation assessment draws on evidence gathered from pilot activity in three special educational needs (SEN) schools in academic years 2022/2023 and 2023/2024. The schools involved were a mix of primary and secondary schools. In total, 484 young people took part (170 in 2022/2023 and 314 in 2023/2024).
- Led by Dr Josie Rawes from the University of York, six outreach team members (including four interns) have delivered this pilot, and eight undergraduate students have been trained (including in Makaton) and involved in delivery at special needs schools.

Method

- Quantitative evaluation feedback gathered by the team at the end of the outreach sessions from 162 young people and 30 members of staff.
- Reflective practice by the team, captured in 'learning logs'.
- Independent ethnography (observation) was carried out at one school in June 2023.
- In July 2024, three case studies were produced with the schools involved.

Key findings

- ✓ 72% of 162 young people were 'very happy' after the sessions and 23% 'happy'.
- ✓ An excellent teacher willingness to recommend score of 9.4 out of 10 (n=30).
- Independent ethnography revealed that the virtual reality (VR) based approach being used by the Physics and Engineering Outreach Team at the University of York is effectively engaging young people of different abilities, and the space subject matter has broad appeal.
- The outcomes reported by schools were: enjoyment, excitement, sustained engagement, increased interest (as demonstrated by asking and answering questions) and improved subject knowledge. Staff attending also picked up new practice, which has been incorporated into their teaching.
- Teacher and teaching assistant feedback affirmed that young people enjoyed the sessions. Staff organising the sessions particularly valued the planning and preparation that had gone into each of the visits. They found the university team to be engaging, responsive and adaptable.
- Special schools stated that this free offer to schools was valued and filling a gap in provision that schools (or parents) could not fill by themselves.
- Based on the evidence gathered so far, this approach has received exemplary feedback and can be considered fit for purpose and highly effective. All of the schools involved wish to continue and develop their relationship with the University.

2 Evaluation approach

“We hope it will become a whole school / whole child offer including our early years. It’s truly inclusive. Outer space can be a dry topic, very factual. This outreach has been a wonderful way to bring it alive and make it experiential. Other SEN young people need this experience too, one that caters to all their needs.”

(Rachel Whittam, Chellow Heights School)

“The quality of the resources was superb – but it was the team who delivered it that made it special, and they were so great with the young people. They got young people engaged who even we struggle with. They were brilliant.”

(Christina Young, Welburn Hall School)

The independent evaluator has taken the following steps:

- Reviewed and commented on surveys created by the team.
- Reviewed the team’s learning logs on a formative basis.
- Reviewed evaluation evidence gathered by the outreach team from three schools.
- Observed one full day session; to see, hear and experience how the sessions have taken place, and to gather feedback from staff and the team during the visits.
- Interviewed staff from each of the schools at a later date to gather their feedback and reflections.

Limitations

This initial assessment is based on a limited evidence base derived from teacher and young people’s feedback from the three schools and ethnographic evidence from one.

After piloting evaluation approaches in 2022/2023, in 2023/2024 162 young people gave their feedback (from a total of 314 young people taking part). In statistical terms, this means that we can be confident that the findings presented here are representative of all students to plus or minus 5.3%.

Feedback from the young people themselves has been limited, but the adapted feedback approaches have worked well and then triangulated with staff feedback. Observation allows the reader to see and hear what went on.

No formal assessment or follow up with the young people to seek cognitive (knowledge) and affective (interest, attitude) outcomes was carried out.

3 Evaluation findings

3.1 Evaluation feedback from young people

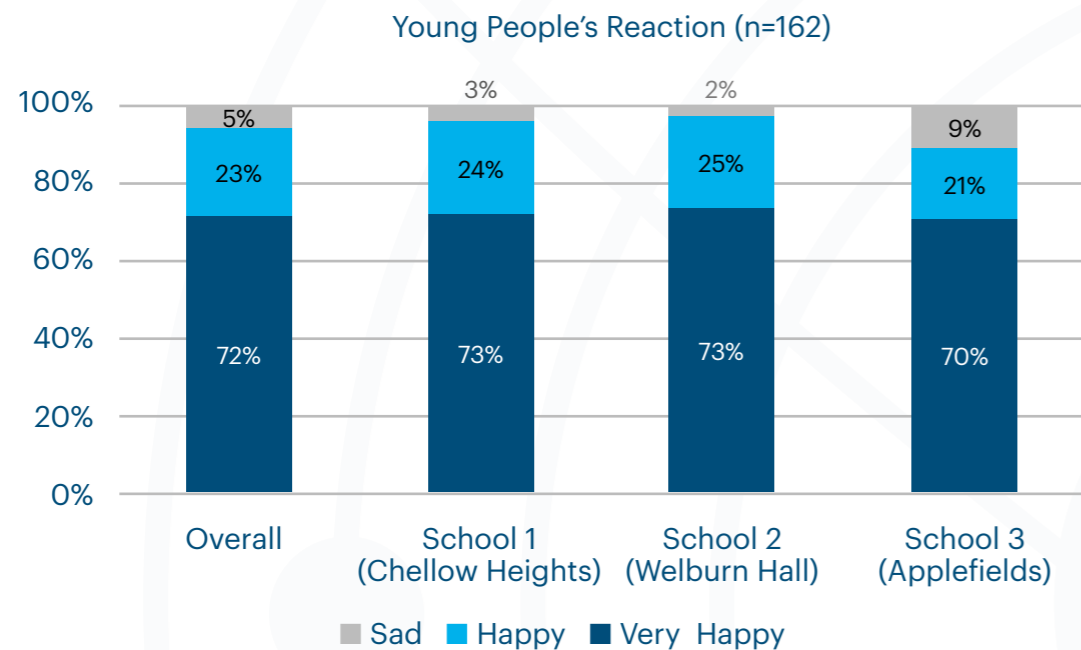
Young people were asked to give their immediate reflections on the extent to which they had enjoyed the session.



Approach

The team used three 'buckets' with emojis and students voted by dropping a ball into the bucket. After the first pilot event (pictured left) the emojis and buckets were the same colour to avoid bias from the children/young people.

The chart below shows school level feedback (n=162).



Across all three schools, 72% of young people said they were 'very happy' after the sessions and 23% 'happy' – with good consistency across the schools.

3.2 Evaluation feedback from teachers

- ✓ On average, 100% of teachers agreed that their groups enjoyed the activity and had been kept engaged throughout.
- ✓ 100% agreed that the young people had learned something new.
- ✓ 97% agreed that the activity had been pitched at the right level
- ✓ The average willingness to recommend score from teachers was 9.4 out of a maximum 10.

In order for the reader to understand how the sessions were delivered, how young people responded and then consider staff feedback, four case studies are now presented. We begin with the evaluator's observation (ethnography) report, followed by the three schools in turn.

The case studies contain learning and testimonials which demonstrate the value that schools attach to taking part.

3.3 Ethnography report

The independent evaluator observed one of the first sessions delivered at Chellow Heights Special School in Bradford (June 2023).

Dr Josie Rawes, a lecturer at the School of Physics, Engineering and Technology, led the sessions at the special school. The workshop had a high staff-student ratio, with trained undergraduate ambassadors assisting throughout.

At the special school the sessions began with a very short introduction, then the young people could wear an astronaut's outfit. There was then ample opportunity to try out the VR headsets (set up for three different experiences) and take part in the sensory activities (with or without the headset). At the end, young people could try the taste of space food (freeze-dried strawberries), take away their astronaut's reflective foil, and they also received a certificate (which was a talking point as parents collected their children from school later).

The mix of stations were designed in consultation with disability charity the Lightyear Foundation and Chellow Heights Special School, and were designed around the abilities of the young people.



VR headsets used as part of the Safe Space workshops



Sensory 'dark den' tent with lights



Tuff tray with tactile materials

Evidence of the positive effect the session had on young people could be seen in the smiles and how young people often pointed in the direction they were looking in through the kits, and could also be heard in their reactions.

Young people took part in their own way, and the carousel format enabled this.

Many of the young people were non-verbal.

For example, one male looked around, went into the sensory tent then came and lay down on the floor. Another took the foam from the tactile tray and played on the mats with it.¹



Space-themed display created by a school following the workshop

The team were calm and resourceful as all this activity unfolded, seeking opportunities to engage more fully with the young people.

While there was a very limited learning element to most of these sessions, a more able class with good cognition did ask questions, and another class from a session held earlier in the term had been inspired to create a space collage. (pictured left)

The headsets proved durable too, as they were dropped or thrown on a few occasions without damaging the phones inside.

3.4 School case study 1

Context

Chellow Heights is a large special school based in Bradford. Based on two separate sites, York's team visited both in 2023 and returned for one more visit in 2024.

Rachel Whittam, who organised and coordinated the visits from Chellow Heights, tells us more:

What happened?

"I was very impressed from the outset. We contacted the team at York and they were very clear, asked questions and didn't make any assumptions. They came with ideas. We had face to face and zoom meetings and as a result they realised they needed to change what they had planned.

There were lots of children to motivate and engage! They also needed to be flexible.

Our young people like the hands on activities so we suggested the sensory tent. It was a long process, but they came back with a very detailed plan. It was clear they had really listened. Communication and team working was great, and then on the visits, how they listened to the children.

Our visit from them in 2024 was even better. We offered it to all the children except those in Early Years. I completely trust the York Outreach team so didn't need to be in all sessions. My role on the day was encouraging young people to come in.

They had made slight amendments and demonstrated more understanding of the different pathways we have. There was less time talking at the front of the class. E.g some children in our cohort have short attention spans while others are non-ambulant. They had thought about everything; for example they had added some switches to the launch which the children loved. I appreciated that they had brought their own wet wipes. That particularly impressed me, they had clearly thought about all the risks. Their risk assessment was strong.

Some of our pathway teachers who attended with their classes told me "Some have never engaged like that before; that's the longest they've concentrated."

We thought some children wouldn't tolerate the VR headset, but we were really surprised by how many did.

The team adapted the set up according to the needs of the different cohorts; so for our green group for example the session was faster flowing. They did brilliantly, especially for our hardest to engage children where they concentrated on core learning- e.g identifying hot, cold, and icy.

The voting at the end was great, they used ping pong which was very visual and engaging."

How the session has inspired other activity

"We've changed things, last year the visit took place during a week when we are doing Space, while this year we are doing a half term unit on the subject. After the session, one of the classes made a space station with moon buggies."

¹ There were two incidences of planets being bitten, which the team are now alert to.

Are there benefits to additional outreach visits?

"It was good for our children to experience this more than once. We find it's better to return to topics in order to reinforce and master. Familiarity with the event also helps them to self regulate better, as they are more relaxed. They are also better placed to focus on the cognition and learning elements. The first time it was excitement and wow! but they took more away this year.

I can evidence this; our blue pathway would not normally even sit in a hall yet they sat for the whole lot and engaged and absorbed. They may not be able to tell us a lot, but the fact that they engaged is massive. I think they are more likely to sit down and get involved in STEM in school now."

What would you have done instead?

"There might be other provision, but is it accessible? There isn't anything like this pitched for special schools. I did lots of research. Having an offer for special schools is pretty unique. York's offer has lots extra – much more than the headsets, it was the whole shebang. It was an experience.

Parents would find it very hard to find something comparable. There's certainly nowhere in Yorkshire."

What factors made it work?

"Claire [York's outreach administrator] and Josie were phenomenal. Claire's organising support was very clear, she has been superb, never last minute.

It was their professional approach and their grasp of the children. They have their clear views on what worked (for example saying no to groups that were too big) but are very willing to take our views on board and adapt to our children and context. Second time around it was clear they had learnt a lot, they were less giddy (less nerves) and even more professional. It's a big thing. The wider team much more calm.

For our ECT [Early Career Teachers] and trainee teachers, to see the York team using the symbols and the switches was an exemplar of good practice and modelling."

Suggested improvements?

"Not really, as we are on two separate sites we had to make some difficult decisions. If you come back next year, come to our other site."

Would you recommend to other schools?

"Absolutely!

It's planned for sensory and non ambulant children so its highly inclusive, engaging and exciting. Even the most sensory learners will gain from it. They will love it as our children have."

How can the relationship with York develop?

"Outer space can be a dry topic, very factual. This outreach has been a wonderful way to bring it alive and make it experiential. Other SEN young people need this experience too, one that caters to all their needs.

We are very proud to be involved and want to feedback our thanks. We hope it will become a whole school / whole child offer including our early years. It's truly inclusive."

3.5 School case study 2

Context

The second case study is from Welburn Hall School, where 101 young people took part, which represents the vast majority of the entire school roll. This school is for young people aged 8-19 years.

Christina Young, who teaches children and young people taking the formal curriculum, tells us what happened.

How was the day organised?

"We had 8 groups of 13 students, so most classes had their own session. There is a mix of nonverbal, pre-curriculum children who enjoyed the sensory elements, through to our formal learners, who also really enjoyed it.

Before the session, class teams had prepared their students, starting two weeks in advance, then giving them daily reminders."

How did the children engage?

"Everyone benefited, and it was a shared experience they can draw on. It was so inclusive.

They all engaged in different ways. For example, our low ability just immersed in the beautiful pictures.

We have one pupil with significant issues, yet he took part in everything. I didn't think he'd cope. Another was asking loads of questions.

What sticks in my mind is as the pupils were leaving, they kept running back and saying bye. It was just lovely.

Our more able pupils were more enthused and spoke about science more. Pupils who had sensory inputs needs perhaps benefited even more."

What enabled the sessions to work well?

"The pre-visit work carried out was excellent. We sent them an overview of our pupils, and whether they required a sensory or education focus. They clearly came prepared.

The risk assessments were in place. As the team took over the school hall for the day, all of the pupils needed pack-ups, which took the most organising. We wondered if this might be too out of routine, but there were no issues reported.

Contact from the team was exemplary, contact with Claire has always been easy and quick. Really reliable.

Really impressed with the whole team for the way they gauged the levels of students very quickly. The team was great. Their original plan was too much, but they were happy to have a shorter lunch break so all could take part. I was so glad to see the women leading the sessions and our girls engaging so well. It made me regret changing majors at university. I am very motivated by getting females into STEM since children always draw male stereotypes.

The 'dose' per session was about right, although some would have stayed in those dark tents all day. It was the perfect amount of time.

The sessions were well paced, so there was not time to wander off. The York team were quick to catch on to the teenage attitudes, they needed the team's constant input."

Would you pay for this session?

"If it wasn't funded we wouldn't have been able to access it. It's as simple as that.

York is my go to now – its free, and that is huge. Our science budget would be eaten up, leaving nothing left for equipment. It is hard to get our kids off site, it's so expensive. York's outreach is the only thing we can use that doesn't rely on fundraising."

Learning points

"The only learning point was for the team to bring in their physical paper DBS certificates so they don't require a member of staff to accompany them."

What next?

"We are planning another space themed day.

Our newer teachers took lots of learning away, for example how the team used sensory trays. It's given our teachers more confidence to teach science and to ask me for resources."

Would you recommend to other schools?

"It made every child a scientist. What is more invaluable it gave them all a sense of achievement, an excitement for learning. It's so important that SEND [Special Educational Needs and Disabilities] young people can access science as everyone should have that right. This was the perfect way for them, they need to see it and feel it. A worksheet won't work for our kids, they need to live it.

The quality of the resources was superb – but it was the team who delivered it that made it special – and they were so great with the young people. They got young people engaged who we struggle with. They were brilliant."

3.6 School case study 3

"The young people from Applefields School had a different workshop. Instead of VR and sensory activities, they had the Cosmodome (inflatable planetarium). They were given the option to put on the space helmets before going in (but not the tin foil ponchos because they rustle too much!). They also had buttons they could press as they entered the dome that made the sound of a count down and a rocket launching.

Once inside, they had a short guide to the night sky and watched a short video about looking for life on Mars.

There were several visually impaired students, so they sat with a team member who had 3D printed models of the constellations, planet surfaces, and a Mars rover." (University of York Outreach Team)

Samantha Hepworth, an Assistant Headteacher who leads on pupil enrichment, now picks up the story, starting with her strongest memory from the day:

"I remember just how excited they all were.

Before they started, they were asking, 'What is that? Are we going to go in?' They were already inquisitive. Inside they were silent in anticipation. They managed so well and that's down to the planning. It was pitched at just the right age, and ability. I felt the enjoyment.

There is really nothing else available to special schools on the scale of the University of York's offer, nothing with the same 'wow factor.'"

What happened?

We split the day into 4 groups based around interest (rather than age), each with set times. The York team had learned sign language [Makaton] and brought visual resources for our young people with VI [visual impairments]. They were quickly into the dome (which took up most of the room) then there was an opportunity for questions. The buttons to press were a lovely touch.

It was quick turnaround! 20 minutes is the maximum young people can manage in a different visual and auditory environment.

What, if any, lasting benefits were there?

What was wonderful was we have a Tim Peake fan who was able to share her passion with her class. She'd tried before in the classroom but this really worked, and these conversations have continued since.

Another class did an ad-hoc week and a half on space and planning a story. Their experienced teacher was happy to let this happen.

As a school we did a STEM day not long after that and the visit definitely inspired us.

Young people will remember the dome, it will be one of the highlights from their time at school. Young people have already told us. It was a bit different.

What factors made it work?

The team really got to know us and sent resources in advance. The young people who took part were our more formal and semi-formal learners.

Our students were really being listened to, they were asking lots of questions, which the team dealt with quickly and were able to move on. They did it really well.

They were brave to sign in front of staff and students who sign all the time.

What, if anything would you change?

Maybe next time an information sheet for parents would be helpful so they can be more involved too.

It would be good to use the 3D resources both inside and outside the dome – as there is an echo inside which made it harder to hear. This is the first time that this cohort has been thought about.

What would you have done instead?

We do have sensory rooms and a projector wall (not the roof), so we could have borrowed resources from YouTube. It wouldn't be interactive, no opportunity to 'go and have a look at the Bear'.

Would you recommend this activity?

We would absolutely do this again. It would be brilliant to involve our two satellite sites (Millthorpe and Manor).

The visits have the wow factor. That wow moment will last throughout their time in school and for the staff too. They will ask in the future, 'Maybe we can do that too?'

It came with funding, which made it accessible to a local authority school (we have already spent next year's budget). It meant the door was open.

We've never been to the university, but we do have minibuses. The school wants to keep the relationship going, to be thought about was really nice. We would want to invest back, perhaps by inviting students to come in etc.

Special needs gets overlooked, especially secondary age, and this age group have especially enjoyed it. It was important for them to take part then to reflect and think about how they navigated a different situation, answered questions and were treated like adults."

3.7 Other outcomes

Led by Dr Josie Rawes, six outreach team members (including four interns) have been involved in the delivery of this pilot.

Eight undergraduate students have been trained by the Lightyear Foundation, received CPD in Makaton², and were then involved in delivery at special needs schools.

Schools praised the team for their willingness to embrace Makaton.

"They did it really well. They were brave to sign in front of staff and students who sign all the time."

(Teacher)

The Pilot Lead, Dr Rawes, considers that university students who engage in outreach work gain not only confidence from their experience, but are also better able to present their course work on account of learning how to explain concepts to many different audiences.

² <https://makaton.org/>

4 Process evaluation learning

As a result of the pilot there has been a great deal of learning about how to deliver the VR sessions. The evaluator would like to present the enabling factors that appear to make a difference to the effectiveness of the sessions.

4.1 Enabling factors

- ✓ Pre-planning, sharing resources and pre-visits built trust and ensured York's team were prepared and the sessions could be inclusive.
- ✓ The effectiveness of the sessions relied on good logistics from schools, and the staff to bring young people in and out efficiently.
- ✓ Schools preparing young people in a way that enabled them to engage, and ensuring there is a large and secure space to use. A factsheet for parents was suggested.
- ✓ Appropriate setup time and opportunity to reset before the next session.
- ✓ Content adapted to meet young people's needs.
- ✓ Cleaning materials to ensure the equipment used was hygienic.
- ✓ The team's skills and expertise, use of Makaton and how they engaged with young people.
- ✓ The high-quality resources used – for example the 3D printed models of the constellations, planet surfaces, and Mars rover.
- ✓ "The wow factor".
- ✓ Simple and fun feedback mechanisms.
- ✓ School staff to stay to support, get involved and manage behaviour if required.
- ✓ A team of at least three to deliver the Cosmodome sessions. Workshops using a carousel approach required six or seven staff / ambassadors.
- ✓ Ability to adapt content in response to the ability and interests of young people.
- ✓ A format that can be repeated with the same young people.

The Outreach team completed a **learning log** following sessions to encourage and support reflective learning and improvement during the pilot. Tips included:

- "Be prepared to take the activities to the students who are less mobile. This could be, holding headsets up for them to see, passing things to them in the dark dens, or holding them up so they can feel them and holding stuff from the tuff trays onto their hands for them to feel."
- "Focus on what the students focus on and try to make use of that."
- "Try to ensure that someone has an eye on every student at all times, be that yourselves or teachers."

5 Conclusions

Based on the evidence from this pilot in SEN schools, the independent evaluator concludes that this outreach activity, including VR technology, is highly effective in engaging young people of different ages and abilities about STEM, in this case, space travel and astronomy. Young people with SEND were able to engage with the session on their own terms (aged 5-19), and for some, enjoyed it more when they took part again a year later.

The equipment is easy for young people to use and appears reliable and sufficiently durable. With judicious charging, the equipment can last for a full day's usage in school. Including other activities, for example sensory trays or dressing up, extends the opportunity to engage.

Young people can enjoy the sensory trays, or for the older or more able, ask questions and take their inspiration back to the classroom. The vast majority of young people appeared to enjoy the sessions. This is in no small part thanks to the planning and preparation of both schools and the York team in advance.

A measure of success, particularly for young people with additional needs, was the extent to which they engaged for the whole session. In one example, the independent evaluator observed a group of young people with multiple and more profound disabilities who were engaged for most of the session. Talking afterwards, these young people would normally engage for 10-15 minutes at most. Schools also reported how young people who they sometimes struggle to engage maintained their attention throughout.

The VR technology, allied to good content, is inspirational. Schools do not have access to this technology for themselves, so it is novel. Pre-planning enables the team to make the sessions as inclusive as possible, for example by sourcing and printing 3D resources so young people with a visual impairment could take part.

Young people were developing their essential skills of listening and following instructions, being curious, being respectful of the contributions of others, and gaining new knowledge about space.

A surprise for the evaluator was the extent to which teachers attending with the young people were also engaged and enjoyed the sessions themselves. Teachers told the learning partner that the session was unexpected for them also and gave them lots to talk about with the young people afterwards.

Staff report that the 'buzz' from the sessions can be sustained beyond the day of the activity; and the approaches modelled by York's team are being picked up and used by teachers who observed the sessions. These have sometimes been whole school, shared experiences, so will likely be highly memorable.

6 Independent assessment

Based on the evidence from young people, teachers, observation and staff interviews, the sessions were very well received and of excellent quality. Schools do not have suppliers willing to travel to them to provide these sorts of sessions to a similar quality, particularly free of charge.

The training from the Lightyear Foundation and CPD in Makaton enabled the York team to shine in the sessions.

The delivery format is tailor-made for schools to access. As long as a suitable space is found, and the school considers the logistics of organising groups of young people taking part, the York team bear the weight of the session. York's outreach team are interesting outsiders to the school. They work hard to keep young people safe, engaged and on topic, to keep the VR kits running, and to support one another.

The flow of the sessions, and the 'dose' appear to be appropriate – "just right" according to one school. The learning elements can be expanded based on the interests and abilities of the young people.

These pilots have successfully demonstrated how, "every young person can be a scientist" and enable SEND young people to have a powerful, highly memorable experience which schools hope to build on. If resources and funding allow, schools would like these events to become regular fixtures, and potentially extended to also include Early Years pupils.

Even for York schools, this pilot was the first time that they had engaged with the University of York and, after this very positive experience, they hope to develop a lasting relationship, fulfilling York's aspiration to be a 'university without limits'.

Disclaimer: The information presented in this independent evaluation report is presented in good faith and deemed to be accurate at time of submission (August 7th, 2024), however the author cannot accept responsibility for errors or omissions. To feedback or to ask questions about this report, please contact Paul Rhodes: E:paulrhodes16@gmail.com.

Thank you for reading!