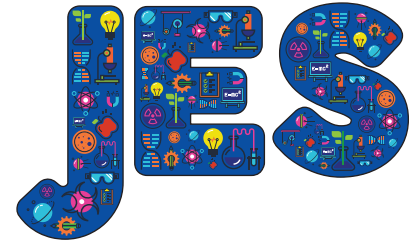


# Co-teaching as a viable model for raising teacher confidence in the delivery of primary science within a small rural school in Northern Ireland



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## Abstract

*This article explores the experiences of classroom teachers, a science subject leader and a Principal taking part in a project on co-teaching practice. The study discusses the findings from a small-scale action research project involving a Primary Science Teaching Trust (PSTT) Fellow (the researcher) co-teaching with each member of staff in a rural school in Northern Ireland. The Principal supported the science subject leader to introduce the co-teaching model as a method for bringing about change in teaching practice, to enhance teaching and learning in science. The staff worked collaboratively with the researcher to enhance the delivery of practical science enquiry. Following the co-teaching sessions, the teachers were encouraged to work with the children to carry out an investigation each half term, and share this with the rest of the school by contributing to a whole school display wall demonstrating good practice. The approach was successful in this setting, with the unreserved support from the Principal; however, in a different context with a greater number of people, a different mixture of personalities and support structures, the outcome could be different.*

## Context

The Primary Science Teaching Trust (PSTT) awards primary teachers for the delivery of good practice in science, with award winners becoming Fellows of the PSTT's virtual College (Shallcross *et al*, 2015). Northern Ireland has seen many award winners and these Fellows have been instrumental in many innovations (e.g. the *Titanic* resource, McDaid, 2016), shaping the future of professional development for primary teachers in this region.

Nevertheless, within many locations in Northern Ireland, there are schools, particularly those in rural

areas, where teachers lack confidence in the delivery of science. This is evident in the number of schools requesting PSTT support for the delivery of practical primary science. There is a need for these teachers to have high quality professional learning opportunities, principally in the delivery of hands-on investigations.

As a PSTT Fellow and Area Mentor for Northern Ireland, I was approached by a small rural school to support them in raising the profile of science enquiry across the school. Being aware of how little professional development rural schools receive, a model of co-teaching (e.g. Kohler-Evans, 2006) was suggested so that teachers had the opportunity to trial new approaches to teaching and learning. The aim was to support teachers in their own setting by utilising the resources they have and working with them to enhance the curriculum that they are currently delivering. This research aims to explore co-teaching as an approach to support teachers in the delivery of science in a school that has had little or no access to Continued Professional Development (CPD).

## Implementing the research

### Why co-teach?

Working collaboratively is the foundation of co-teaching, which involves two or more teachers who plan, teach and evaluate their teaching together to provide a rewarding and informative practical experience of science for the children, whilst also benefitting from the experience themselves by learning from each other. When teachers begin working together, and share the full responsibility for planning, teaching and reflecting on lessons, there is '*automatically a greater range of action possibilities*', and collective activity enables each individual to develop, since '*any individual can now enact teaching practices not available in individual teaching*' (Roth & Tobin, 2005, p.x).



Co-teaching has been part of inclusive practices for nearly 30 years (Bauwens, Houcade & Friend, 1989). There is growing evidence of its effectiveness, with co-teaching implementations associated with significantly improved student outcomes (Benningfield, 2012). Although much has been written about the importance of co-teachers having a strong professional relationship (Kohler-Evans, 2006), and co-teaching often being referred to as a 'professional marriage' (Friend, 2014), this emphasis must be weighed against the purpose of co-teaching to ensure improved student outcomes. In this research, the emphasis initially is on building a relationship with teachers in a short time span, whilst being mindful that the shared experience will impact upon children's learning in the long term.

### Planning the co-teaching lessons

The instructional potential of co-teaching makes it imperative that those involved collaborate effectively in designing and delivering instruction and interventions that will best meet the unique needs of the teachers and pupils. There are a large number of factors to be taken into consideration on how to structure and deliver the shared experience, including practical factors pertaining to resources, classroom layout, and the amount of time available for each lesson. In this study, 3 co-teaching approaches from Cook and Friend (2017, p.165) were considered at the pre-planning stage:

- ❑ *One Teach, One Observe.* One of the advantages in co-teaching is that more detailed observation of children engaged in the learning process can occur. With this approach, co-teachers can decide in advance what types of specific observational information to gather during instruction and can agree on a system for gathering the data. Afterwards, the teachers analyse the information together. The teachers should take turns teaching and gathering data, rather than assuming that only one person should be the observer.
- ❑ *Teaming.* In teaming, both teachers share delivery of the same instruction to a whole class. Some teachers refer to this as having 'one brain in two bodies' or 'tag team teaching'. Most co-teachers consider this approach the most complex but satisfying way to co-teach, but it is the approach that is most dependent on teachers' styles.

- ❑ *One Teach, One Assist.* In this approach, one person would keep primary responsibility for teaching while the other professional circulated through the room providing unobtrusive assistance to children as needed. This should be the least often employed co-teaching approach (Friend, 2014), since it does not use the skills of both teachers or support the concept of co-teaching being a shared experience in its purest sense.

### Project background

The school in this study is a rural school with 220 children; there are 7 classes, 7 members of staff and the science subject leader, who is also Vice Principal. From the outset, the project had the full support of the Principal who, on my first visit to the school, immediately convened a staff meeting so that all staff would hear about the project personally, reinforcing a positive approach with their own personal enthusiasm for the research.

The project ran for a full academic year, spanning either side of the summer break. It should be noted that, in the Northern Ireland curriculum, 'science and technology' comes under the umbrella of the 'World around Us', which also includes history and geography. As a result of these subjects being amalgamated, and the curriculum being topic-led, science in some schools has 'dropped off the radar'. Compounding this problem is the demise of subject advisers in education boards and the small availability of science-specific CPD, resulting in limited support for primary teachers.

Before the planning meetings, each teacher completed a questionnaire requiring them to share their most recent qualification, length of career, phases taught, training, level of confidence in the delivery of practical science and in each area of the science curriculum. This information gave an understanding of their background within teaching and how they felt about teaching practical science. Lack of professional development opportunities were borne out by the responses concerning training: none of the respondents had received any formal training in science in the previous 10 years, whilst 75% had received training of 1-3 days in literacy within the 10-year timescale but, interestingly, only 12.5% in maths during the same period.



## The co-teaching experience

Interactions with the Key Stage 1 (ages 5-7) teachers at the planning phase focused more on planning for progression rather than choice of co-teaching models, with *Team Teaching* selected due to the significant amount of time co-planning. Despite the deficiencies in discussing the co-teaching model at length, the initial experiences were rewarding, with future targets identified for both the teachers involved and the researcher. Co-teaching generated the opportunity for reflective teachers to recognise the need to spend more time on practical science and to increase the use of scientific vocabulary. Questioning children's understanding throughout the investigations without negating the experience also became apparent during the sessions. Although the researcher had only been at the school a short time, the experience of collaborating with teachers during the co-teaching sessions was a useful tool for reflecting upon teaching approaches. Researching co-teaching approaches highlighted the importance of interpersonal communication to enhance the effectiveness of communication between professionals (Adler, Rosenfeld & Proctor, 2015). Working with another colleague creates an awareness and reflection of one's own strengths and weaknesses. This aspect of co-teaching was demanding but valuable, recognising the need to adapt your approach to each teacher to get the best out of the situation. The skill of building positive working relationships was crucial to providing the children with a constructive environment for learning.

Co-teaching in Key Stage 2 provided two different experiences: the *One Teach, One Observe* approach, and *Teaming* with elements of parallel teaching. Both these sessions were pre-planned with the teachers, as these members of staff had mixed ability classes, including some children with special educational needs, and they wanted to be fully briefed on how the sessions would run. Both teachers were receptive to experiencing practical investigations involving active hands-on experiences for the children related to their current topics.

The *Teaming* session involved the modelling of the digestive system, which was a new experience for the teacher. The digestion lesson leads the children in groups of three through a set of instructions to show the changes that occur as food travels

**Figure 1.** Modelling digestion: From the stomach to the small intestine.



through the body and is finally excreted (Figure 1). They begin by mashing Weetabix and banana with a knife and fork to replicate their teeth. Then, they use a food bag to represent their stomachs and, finally, move the mashed moist food through tights to represent the small and large intestines. At each stage, they add the appropriate liquid to help break down the food: e.g. saliva, stomach acid, bile and pancreatic juice. This modelling of the procedure supports the children to understand the process of digestion and gives the opportunity to introduce the scientific vocabulary in context.

During the practical activities the teacher and the researcher alternated pausing the lesson to recap children's understanding and reinforce scientific vocabulary. There was no pre-fixed agenda for this to happen; it evolved due to the interaction between the two teachers as reflective practitioners. This was deemed to be a rewarding experience for both teachers. Following the session, the class teacher was surprised to hear that a previously quiet child had taken the lead in

his/her trio. This feedback highlighted the positive impact of co-teaching by having a second teacher in the room, which allowed for more observation and interaction with pupils. The teacher was also impressed with the way that the whole class had responded to the practical approach to teaching digestion and felt it would significantly support their learning. Both teachers enjoyed the co-teaching experience and recognised the positive outcomes of a mutual focus, with the children benefitting from two teachers collaborating to support their learning.

The *One Teach, One Observe* approach was requested by the second teacher involved in this study, so that they could gain an understanding of the researcher's approach to scientific enquiry. In response to the initial questionnaire and discussions prior to the session, this teacher acknowledged enjoying science and was confident teaching the subject. There was a reluctance to be involved in the planning of the session, despite reassurances that it could be taught collaboratively. The *One Teach, One Observe* model was agreed so that the observer could determine how a class that needed a lot of support would respond to practical science enquiry involving an open-ended investigation.

As part of the topic of 'Rescue at Sea', the session was placed in the context of the famous Victorian, Grace Darling, who assisted in the rescue of survivors from the shipwrecked *Forfarshire* in 1838. The lesson took place in the school hall, with the children put into groups of 4 and asked to replicate a distress 'flare' from the *Forfarshire* crew. The children were given a photograph of other children launching a Stomp rocket and asked to produce their own, before considering which group had created the best design. They were offered a selection of equipment for their own design. Initially, the children were hesitant and unsure, as they were not used to working in this way.

Reassuring the children that they could take any equipment they thought appropriate, and convincing them that they were scientists testing prototypes, gave them the confidence to go ahead and test their designs. Their first attempts were unsuccessful and the teacher-observer wanted to intervene, but the researcher advised to wait for one group to succeed and the others would then

**Figure 2.** Stomp rockets: testing.



follow their lead. This happened (Figure 2) and the children then devised a way of measuring the distance travelled by the rockets. At this point, the teacher became as excited as the children and stated how pleased they were with the outcome. As with other lessons, the children were paused in their investigations to discuss and evaluate their work, using scientific vocabulary and, again, the teacher stated how pleased they were with their answers.

The Principal later noted that the teacher was amazed at what the children had achieved and how much the teacher had enjoyed observing them working in that way. The opportunity for a teacher to observe children working independently can be one of the key factors in influencing teachers to consider change in their own practice.

### Teacher reflections on the co-teaching experience

I returned to the school after a period of three months to interview the staff and discuss the



developments in science since my previous visits. In the interim, I had remained in touch with the subject leader to offer support with planning and progression as and when needed. The responses from the teachers were as follows:

*'I was surprised that I didn't feel threatened by your presence in the classroom. I actually enjoyed the collaborative experience and would like to do more co-teaching. It gave me confidence in my own ability to teach science.'*

*'At first I thought raising the profile of practical science would mean a lot of extra work, it does require more preparation but it is worth it as I now see the engagement and enjoyment the children get from the experience.'*

*'The science subject leader has brought us all together and supported us to deliver more science enquiry lessons, which the children really enjoy. Their enthusiasm inspires me to make the effort to gather the resources to deliver practical lessons.'*

Discussions with children confirmed that they had been taking an active part in practical science enquiry sessions. There was evidence of problem-solving and children taking the lead in scientific enquiry, both at school and at home. There were up-to-date displays showing science progression across the whole school and evidence of scientific vocabulary in most classrooms. P7 (aged 10-11) children shared their STEM project on Wind Turbine design within a school assembly prior to presenting their findings at the Young Innovators event in Belfast. At a subsequent meeting, the Principal confirmed that science was now firmly established on the school development plan and that the school had decided to apply for the Primary Science Quality Mark ([www.psqm.org.uk](http://www.psqm.org.uk)).

Thoughts on the co-teaching model were shared in an interview with the Principal:

*'The current in-service model consisting of those teachers who are interested in a particular area of the curriculum attending training and reporting back to others has its drawbacks: cost and time to implement change, particularly in a small school. Whilst in-house co-teaching has the desired impact because you bring every member of the team with you in relation to new aspects of learning. For this to have any element of success, it is essential*

*that senior managers know and understand their staff well if they want their school to experience co-teaching.'*

## Reflection

This experience highlighted the importance of interpersonal skills, in particular the need to clearly communicate the concept of co-teaching as a model for sharing, not a one-sided experience for the class teacher to be influenced by the researcher. There needs to be awareness that, when working alongside teachers in school, the researcher is not perceived as the expert. The whole concept of co-teaching is that each participant benefits from the experience, not just the classroom teacher. The exercise of co-teaching helps all those involved to reflect upon their own practice. What was surprising was how easy and enjoyable the experience of co-teaching became, with teachers I had not met before, which gave rise to the opportunity to reflect upon personal teaching skills. Reflective teaching means looking at what you do in the classroom, thinking about why you do it, and thinking about whether it works – a process of self-observation and self-evaluation. The experience raised an awareness of questioning techniques and the methods used for classroom management. On reflection, if this model were to be repeated in a different setting, more time should be spent pre-planning with the teachers and confirming that they fully understood the concept of co-teaching as a shared experience. There is no doubt that this would not have been as fulfilling an experience without the support of the Principal – their input throughout the duration of the project was a positive constant.

However, despite the apparent success, it also demonstrated there are no easy answers to implementing change within a school. With these teachers in their own familiar setting, the co-teaching did go some way towards providing in-service training that brought about a change in practice. The level of implementation is down to the individual teacher. Fullan (1991, p.114) observes: *'Changing structures is easier to bring about than changes in values, beliefs, behaviour and other normative and cultural changes'*.

Change was successful in this case study due to the support given to the science subject leader. The Principal enabled him to grow in confidence and to



lead the staff to significantly raise the profile of science across the school. The Principal confirmed that the science lead had grown in confidence and had been the driver for change within the school. Establishing the co-teaching helped him to understand the teachers' needs and doubts through observations and discussions, which enabled him to recognise that he could influence the teaching and learning in science throughout the school.

Co-teaching as a model of CPD involves meeting individuals, getting a clear picture of where they are in relation to their ability to adapt their own learning and teaching style to enable them to reflect and improve their practice. It is labour-intensive, but can lead to 'changing people', both researcher and teacher. In a larger school, the Lesson Study approach would be worth considering, with previous studies showing how, in this model, schools can provide their own CPD. Lesson Study involves groups of teachers collaboratively planning, teaching, observing and analysing learning and teaching in 'research lessons'. Over a cycle of research lessons, they may innovate or refine a pedagogical approach, which will be shared with others (Dudley, 2011).

This project began by asking: is co-teaching a viable model for Continued Professional Development? For this setting, the answer is 'yes': the experience was positive from both from the researcher's perspective and that of the school. There was a change within the school in its approach to delivering practical science. This study gave the opportunity for the researcher to reflect upon her approach as a mentor supporting teachers in a variety of settings and with differing needs. Fortuitously, in this case study the experience of co-teaching was immensely beneficial and the researcher would welcome the opportunity to repeat the practice.

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