



**QUEEN'S
UNIVERSITY
BELFAST**

Science learning in the outdoors to support primary-secondary transition

Kerr, K. (2016). Science learning in the outdoors to support primary-secondary transition. *School Science Review*, 98(362), 27-32.

Published in:
School Science Review

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights
Copyright the author 2016.

General rights
Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Science learning in the outdoors to support primary–secondary transition

Karen Kerr

ABSTRACT This article builds on and contributes to work in the area of science learning in the outdoors and addressing transition issues for pupils as they move from primary to secondary school. Previous studies have examined issues in the transition phase between primary and secondary school, but evidence is limited for the use of learning science outdoors as a delivery model to address transition issues. This study provides additional insight into how outdoor learning can be used as a vehicle to address transition issues. It analyses the benefits of outdoor learning through the use of shared learning days with pupils in transition phases across all the cited outcome categories: cognitive, affective, interpersonal/social and physical/behavioural. The article argues that a carefully designed programme of outdoor ‘shared learning days’ with pupils in both phases working together is a sound model to help address the recommendations arising from specific transition issues through the delivery of aligned outcomes and impact from learning science outdoors.

I was quite scared ... it made me more confident, I have nothing to worry about, you might not be in the same class as your friends but you can make new friends. (primary pupil)

Introduction

Transition between primary and secondary school

Around the globe, transition in the middle years of schooling presents real difficulties and a ‘*puzzling terrain to traverse*’ to the extent that many pupils ‘*unlearn*’ skills and content (Andrews and Bishop, 2012: 8). Transition is cited as a stressful and anxious time for all pupils, even those who adjust well to their new school, and the effects of a poor transition can include psychological problems and temporary or ongoing attainment issues (Rice, Frederickson and Seymour, 2011). It is also important to note that transition between primary and secondary school occurs at a time when pupils of this age are experiencing significant social, emotional, cognitive and physical changes, which can intensify the transition experience (Andrews and Bishop, 2012).

Not only is transition a well-cited international concern, it is well documented in the UK and Northern Ireland and has been in the spotlight for some time, particularly during times of change. For example, Jarman (1997: 297) considered

transition issues when the Northern Ireland science curriculum was first introduced; she cited academic continuity as a particular issue that, for more able pupils, results in less positive attitudes to science at secondary level, perhaps because they are at a greater risk of going over ‘*ground which is already covered*’.

In short, transition issues are often characterised as academic and/or social, with an increasing number of scholars in the area citing both as having an impact on pupils (Andrews and Bishop, 2012; Mackenzie, McMaugh and O’Sullivan, 2012).

Several approaches and programmes have traditionally been implemented to address social and academic transition issues and there is an age-old debate in relation to which programmes work best. These approaches can include several elements: sharing of data between phases and teachers, increased communication, visits, mentors, out-of-school activities, collaborative teaching and learning programmes, involvement of parents, and attending to vulnerable populations (Mizelle, 2005; Andrews and Bishop, 2012). More recently, there is a positive move and an evidence base to suggest that collaborative programmes with academic and social elements are most effective to smooth the transition process (Thurston *et al.*, 2010).

Rose's (2009) review of the curriculum also made two specific recommendations in relation to transition: a joint policy between primary and secondary schools for five different purposes to include social and personal ones as well as those to do with curriculum and pedagogy, and the design of specific curricular materials to further strengthen continuity between these two phases.

With specific reference to Northern Ireland, the context for the current study, Mullan (2014) considered the social and academic impact of transition among pupils in the pre- and post-transition year groups (last year of primary school, first year of secondary school) as well as their preferred collaborative approach in helping them to settle into secondary school. Based on his findings from surveys of pupils and teachers, he recommended that effective transition can be achieved through *collaborative* programmes that address both *social* and *academic* development and transition (Mullan, 2014).

Learning science in the outdoor classroom – social and academic transition

Learning outside the classroom is often cited as a panacea for both social and academic development. It is well documented that pupils enjoy and remember outdoor work (Dillon *et al.*, 2006). Eaton (2000) also found that learning experiences conducted in the outdoors were more likely to have a cognitive impact than those conducted in classrooms. Mittelstaedt, Sanker and Vanderveer (1999) also reported positive impacts on pupils' attitudes to the environment.

When considering the impact and possible effects of outdoor learning, leading researchers in the area have presented several conceptual and theoretical underpinnings in an attempt to encompass and categorise the benefits of such work. Perhaps the most comprehensive of these categorisations is that presented by Rickinson *et al.* (2004): cognitive impacts, affective impacts, interpersonal/social impacts and physical/behavioural impacts. They defined cognitive impacts as academic outcomes to include knowledge and understanding and affective impacts as incorporating '*attitudes, values, beliefs and self-perceptions*' (p. 15). Interpersonal/social impacts are said to include communication skills, leadership and teamwork, while physical/behavioural impacts are related to '*physical fitness, physical skills, personal behaviours and social actions*' (p. 15).

In the context of transition between primary and secondary school, this article will argue that a carefully designed collaborative programme of outdoor 'shared learning days', with pupils in both phases working together, is a sound model to help address the recommendations arising from specific transition issues (Mullan, 2014; Rose, 2009) through the delivery of aligned outcomes and impact from learning science outdoors (Rickinson *et al.*, 2004). In other words, the cognitive and academic aspects of transition may be addressed through the cognitive and affective impact of outdoor learning and the social and personal aspects of transition through the interpersonal/social impacts and physical/behavioural impacts.

Methods

The findings from this project were much wider than those reported here and also considered the use of co-teaching for continuing professional development in a context of curriculum change. It encompassed carefully designed pre and post testing across various impact categories as well as in-depth interviews and focus groups with those involved (pupils and teachers). The findings presented here have been drawn from the in-depth interviews and focus groups with the teachers and pupils who took part in the project, where they were specifically asked about, and talked about, the benefits and challenges of this project in relation to primary/secondary transition. Findings related to the wider aims of the larger project with respect to teacher development and environmental aspects of impact are presented by the author elsewhere (Kerr, 2013). A focus group was carried out with a small group of pupils in each of the eight schools involved. All of the teachers involved in the project were interviewed at the end of the academic year.

Data on transition issues from the interviews and focus groups were themed and categorised in line with the questions asked and project outcomes. Given that this evaluation method produced a vast amount of data, selected indicative quotes will be presented in this article under the categorised outcome areas (Rickinson *et al.*, 2004).

Participants

Teachers from four primary and four secondary schools in Northern Ireland took part. All eight teachers were involved with pupils in the

transition years. Four of these teachers taught pupils in their final year of primary school and four of them were science teachers for pupils in their first year of secondary school. Two teachers worked collaboratively (one primary and one secondary) to co-plan, co-teach and co-evaluate two ‘shared learning days’ in an outdoor classroom with their two class groups. In total, 180 pupils took part. The pupils in the last year of primary school were 10 and 11 years old and those in their first year of secondary school were 11 and 12 years old.

Shared learning (and teaching) days in the outdoors

Each pair of classes took part in two ‘shared learning days’ in the outdoors. The pupils took part in a wide variety of tasks and activities during their shared learning days in their local parks and their school grounds. The teachers involved wanted to use their locality and aimed to embed an outdoor learning project into their science planning and lessons without the need for potentially costly ‘field trips’. The activities were co-planned and co-designed by the teachers to best meet the needs of their two classes and their curricula. The shared learning days included projects on invertebrates, habitats and food chains, a park and woods study and an ancient wood study. (A teaching pack outlining these projects and their materials in full is available at: www.qub.ac.uk/research-centres/CentreforEffectiveEducation/Filestore/Fileupload,478531,en.pdf.) The project ended with a celebration event at Queen’s University Belfast, where the pupils presented their projects and explained their learning in mixed-age teams (primary and secondary) to an audience of teachers, stakeholders and those involved in environmental education. This was a very exciting day and was particularly powerful given that no ‘grown-ups’ took part in the presentations!

Findings

Cognitive/academic outcomes

The teachers commented on the improvement in the pupils’ science knowledge, as well as their knowledge about the practicalities of ‘big school’, such as the size of the building and how to move around it:

It’s going to be the same routine going to other schools – huge buildings, lots of classrooms, lots

of movement, hundreds of pupils moving around them so practically it’s given them a bit more confidence about the reality of going to post primary school. (primary teacher)

The primary-aged pupils also talked about being more aware of and prepared for the practicalities of going to ‘the big school’. In addition, the secondary-level pupils enjoyed sharing their experiences and reflected on how beneficial this project would have been for them if they had been involved, particularly in relation to knowing more about secondary school:

It gives you more experience for next year, moving on ... ‘cause if you’d never been you wouldn’t have known where some of the rooms are but we found out where some of the rooms were ... ‘cause then you might get lost some days and for when you get there on your first day and all. (primary pupil)

We would have known what to expect. (secondary pupil)

The primary pupils also talked about learning more science through their involvement in the project and how the secondary pupils were able to teach them and help them with the science and the equipment, thereby making them more positive about what science was going to be like in secondary school:

You might not have known the stuff but then when you went to the outdoors you learned the stuff. (primary pupil)

‘Cause we did science and you know all the answers because we did it in primary school, you’ll be able to answer [in secondary school]. (primary pupil)

We never knew how to use any of that stuff and now we do. (primary pupil)

‘Cause you’ll be using different equipment when you go to big school and you might not have known how to work it. (primary pupil)

Affective outcomes

As well as the benefits in terms of the pupils’ science knowledge and skills, teachers also talked about how much the pupils gained affectively, in relation to their engagement with each other through working with others in the transition phase:

'The interaction with the two groups of kids, they were all engaged, they were all so excited ... they were so positive about their role as mentors ... They took it so seriously, it was unbelievable. (secondary teacher)

This quote also addresses another common criticism with bridging projects in the primary/secondary transition phase – that the pupils who have already moved to secondary level do not benefit as much. However, all of the teachers, particularly the secondary teachers, commented on how much the pupils in the secondary group gained from their involvement in the project.

Aside from being more positive about learning science, the primary pupils also talked at length about how much more positive they were about moving to secondary school:

After the science thing, I felt a bit more confident going into first year because I was a bit nervous because you are in wee groups without your friends because you need to have a similar second name and you kind of want to stay with your friends ... but with that thing there's a whole big group of different people so it's kind of reassured me that it won't be as scary as I thought. (primary pupil)

Interpersonal/social outcomes

The teachers talked at length about the benefits of the project in terms of the pupils' transition, both for the primary group and the secondary group. In particular, they talked about the benefits for the primary pupils in terms of *socialising* with pupils who are already at secondary school and hearing about transition from their peers, which led to them being more *comfortable with that type of environment* and increased their *confidence*. Another important element was *meeting* teachers and meeting friends who will be there when they get there:

Another benefit I would see is the teachers working hand in hand. There is another project where the teachers come in to the school to talk to the young people but I personally don't think that that can have the same impact on P7s [last year of primary school], a teacher coming from a secondary school, year 8 [first year of secondary school], and I think the young people just sit there, particularly the young people who are maybe not as keen to go on academically, you might lose those young people – they just see them as another

adult coming and standing at the top of the room and not engaging with them. (primary teacher)

This quote specifically addressed two criticisms of transition work. Firstly, that primary pupils may become uninterested if engaging with secondary schools that they do not plan to attend. This is particularly important in Northern Ireland if the secondary level school is a grammar school and, therefore, requires pupils to pass an academic entrance exam. Secondly, that pupils may become disengaged when being told what the school is like by an adult and not by a peer, who has experienced it as a pupil. However, the teachers and pupils talked about similar benefits, with regard to transition, regardless of what school they were transferring to.

The primary and secondary pupils talked at great length about *meeting and socialising* with the other pupils in terms of: sharing experience, making friends and giving reassurance about secondary school and being more positive about secondary science:

Especially 'cause we were telling them it ... it's not as if an adult was telling them it and they wouldn't be listening 'cause it would have been years ago they went through school. (secondary pupil)

The quote here relates to the earlier comment made by a teacher about the sometimes ineffective approach of having secondary teachers 'visit' primary schools to talk to pupils. The pupils in this study found it more beneficial to hear from their peers through this collaborative outdoor learning project.

Physical/behavioural outcomes

Many of the secondary pupils talked about physical things they will now do, in relation to transition, as a result of being involved in this project. This centred on *looking out for or helping* the primary-aged pupils when they see them around the secondary school the following September:

We've made friends that we can look after when they come up next year and we can show them around the school and they'll be quite close to us so we can help them with things and if they have problems, they can come to us and we'll be in the school whenever they need us. (secondary pupil)

They'll know the ones going in to that school and ask did you do it this way or that way and they can give them tips on it. (secondary pupil)

Many of the primary pupils were actively looking forward to going to secondary school and learning science there:

I want to become a year 8 [first year of secondary school]. (primary pupil)

You see all the classrooms and you realise there's not a lot of that in our classroom and you can't wait to, like, learn more about it. (primary pupil)

Conclusions and recommendations

The outcomes of the programme for impact in relation to social and academic transition were evident across various domains as outlined in the literature: cognitive impacts, affective impacts, interpersonal/social impacts and physical/behavioural impacts (Rickinson *et al.*, 2004).

In relation to the cognitive/academic impact of the project, the teachers and pupils involved in this outdoor learning project talked about how they increased their science knowledge, learned more about science as subject as well as how to use the equipment, and learned more about the practicalities of going to 'big school', and being prepared for these. In other words, the outdoor learning project enhanced their scientific knowledge as well as their knowledge of transition – truly 'academic' outcomes for a collaborative outdoor learning project, as recommended in the Northern Ireland context by Mullan (2014) and, more widely, by Rose (2009). A limitation of these cognitive/academic measures relates to their qualitative content – it would be much more powerful in terms of building an evidence base (particularly for policy makers) to include true measures of attainment and knowledge in science. However, this recommendation should be viewed with caution as 'measuring' and tracking pupils for a project such as this may in turn impact on the well-cited 'enjoyment' factor of learning outdoors in a less formal way.

In relation to the social impact of the project, the teachers and pupils involved in this outdoor learning project talked about the importance of the socialising aspect of the project and being able to talk directly to their peers about transition worries, as well as learning science together. The pupils talked of being more positive about transition and many planned to actively help transitioning pupils in the future. The primary pupils talked about actively looking forward to being in secondary school. The pupils also benefited from working in teams and hearing about 'big school' from their peer group and not from teachers – from 'the horse's mouth' so to speak. The teachers noted an increased confidence in relation to transition and how much more comfortable the primary pupils were with the different environment. Those of us who have spent time learning outdoors, particularly with young people, would argue that the social and teamwork element of learning outdoors lends itself to a naturally more social environment where the confines of the classroom are no longer in place. These findings in particular merit further investigation in relation to the discourse and nuances of what is discussed by young people when they work in the outdoors.

The findings from this project clearly demonstrate that a carefully planned, collaborative outdoor learning project across the transition phase leads to positive academic and social benefits for transitioning as well as transitioned pupils.

Acknowledgements

This work was funded by the Primary Science Teaching Trust (PSTT). We would also like to thank all the children, teachers, principals and stakeholders who contributed to the development of creative science teaching in lots of outdoor classrooms!

References

- Andrews, C. and Bishop, P. (2012) Middle grades transition programs around the globe. *Middle School Journal*, **44**(1), 8–14.
- Dillon, J., Rickinson, M., Teamey, K., Morris, M., Young Choi, M., Sanders, D. and Benefield, P. (2006) The value of outdoor learning: evidence from research in the UK and elsewhere. *School Science Review*, **87**(320), 107–111.
- Eaton, D. (2000) Cognitive and affective learning in outdoor education. *Dissertation Abstracts International – Section A: Humanities and Social Sciences*, **60**, 10-A, 3595.
- Jarman, R. (1997) Fine in theory: a study of primary–secondary continuity in science, prior and subsequent to the introduction of the Northern Ireland Curriculum. *Educational Research*, **39**(3), 291–310.
- Kerr, K. (2013) *New Approaches to Key Stage 2/3 Science Teaching in the Outdoor Classroom (NASTOC): Final Report*. Belfast: School of Education, Queen's University Belfast. Available at: www.qub.ac.uk/research-centres/CentreforEffectiveEducation/Filestore/Filetoupload,478529,en.pdf.

- Mackenzie, E., McMaugh, A. and O’Sullivan, K. (2012) Perceptions of primary to secondary school transitions: challenge or threat? *Issues in Educational Research*, **22**(3), 298–314.
- Mittelstaedt, R., Sanker, L. and Vanderveer, B. (1999) Impact of a week-long experiential education program on environmental attitude and awareness. *Journal of Experiential Education*, **22**(3), 138–148.
- Mizelle, N. B. (2005) Moving out of middle school. *Educational Leadership*, **62**(7), 56–60.
- Mullan, S. (2014) *Transition: A Process of Change in Need of Change*. Unpublished Master’s dissertation: Queen’s University Belfast.
- Rice, F., Frederickson, N. and Seymour, J. (2011) Assessing pupil concerns about transition to secondary school. *British Journal of Educational Psychology*, **81**(2), 244–263.
- Rickinson, M., Dillon, J., Teamey, K., Morris, M., Young Choi, M., Sanders, D. and Benefield, P. (2004) *A Review of Research on Outdoor Learning*. England: Field Studies Council.
- Rose, J. (2009) *Independent Review of the Primary Curriculum: Final Report*. Nottingham: Department of Children, Schools and Families. Available at: www.educationengland.org.uk/documents/pdfs/2009-IRPC-final-report.pdf.
- Thurston, A., Topping, K., Tolmie, A., Christie, D., Karagiannidou, E. and Murray, P. (2010) Cooperative learning in science: follow-up from primary to high school. *International Journal of Science Education*, **32**(4), 501–522.

Karen Kerr is a Lecturer in Education and Director of Internationalisation in the School of Social Sciences, Education and Social Work at Queen’s University Belfast, Northern Ireland. Email: k.kerr@qub.ac.uk



Download
now

Free KS3 Science Syllabus

A new approach to teaching
the programme of study

10 big ideas and mastery
goals to equip students for
success at GCSE

To download your free syllabus visit
aqa.org.uk/ks3ase

