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Aller au sommaire du numéro

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Profiles of Creativity:

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Lynn D. Newton, *MA(Ed.), PhD.,* is a lecturer and researcher at Durham University and she is also the Head of the School of Education. Her academic interests relate to teaching and learning in primary schools, particularly in the areas of science education and in how to encourage learners to understand and think creatively about science. She was one of the Durham authors of the report for the Durham Commission for Creativity in Education (James *et* al, 2019) and is involved in the second phase of the Commission's work, currently underway. She has published a number of books and papers on creativity over the past decade or so, including *Creativity for a New Curriculum: 5-11* (Newton, ed., 2012), that addressed the challenges of thinking about creativity in all disciplines of the National Curriculum for England, not just in the arts subjects.

Durham University
School of Education

Being a learner

I think my academic interest in creativity, and teaching for creative thinking in particular, began about 15 years ago, but it was more of a natural development from previous research into teachers' questioning, understanding and problem solving in science. But perhaps even these weren't the starting points. Before came my own experiences as a learner and as a teacher and the opportunities that fostered creative thinking were probably there from a very early age.

The starting point was possibly my curiosity about the world around me. I know that my interest in science, and particularly in biology, began when I was very young. I grew up in a small rural village with countryside around me to explore. I recall clearly one particular infant school teacher who regularly took us on nature walks to investigate the hedgerows, fields and streams near our school. She encouraged us to look carefully at things, draw them and talk about what we saw as things changed through the seasons. She taught us the names of common plants and birds, but knowing the names wasn't enough. I wanted to know more. The first prize I was awarded in the primary school was an *Encyclopaedia of Nature.* Since we did not choose our prizes, I think my teacher summed me up well. I know I was a pest, always asking questions and wanting to know why things were as they were. My father did his best to answer my questions, although usually by turning them on their head and

asking me about what I already knew and how we could find out what I didn't know. My father wasn't a teacher – he was a mining engineer – but his approach stayed with me and is one I used myself when I was a teacher in schools and I still use it with undergraduate and PhD students.

As an only child, I often had to entertain myself but I loved reading and making things so this was not a problem. I learned to sew, knit, cook and bake. I played with construction kits like Lego™ and Meccano™ and I helped my father in the garden and in his garage, where I learned to handle tools. There were also lots of books at home: encyclopaedias and books on mathematics and science, world history and geography. As I grew older, I began to use these as reference sources. I also knew from a very early age I wanted to be a teacher.

I attended a very traditional Grammar School and here began my appreciation of great teachers who encouraged understanding and made explicit the relevance of what was being learned as opposed to those who simply pushed you to learn because it might be on the exam papers. Although I doubt I was aware of it at the time, constructs such as creative thinking, understanding, and critical engagement must have been growing in my adolescent brain. What I did know was that I did not like simply trying to rote learn things. I needed explanations about how things worked and opportunities to try things for myself. Although I enjoyed subjects like art and history, I loved doing the practical work in the science subjects, so it was inevitable that I would go on to study the sciences – Biology, Chemistry and Physics - at the Advanced Level.

For whatever reason, I ended up with a place at university to read Biochemistry. This was never going to work for me so I soon changed track and began to study Education with Biology. Without doubt the highlights of my degree were when we were active and doing things, especially the biology laboratory work and the fieldtrips. For me, the practical activity was so very much more important than just reading about something or listening to someone. Alongside the biology, I was studying aspects of education in preparation for becoming a teacher. After four years at university, completing my degree and gaining qualified teacher status, I began a career as a teacher. I know my Biology tutor was very disappointed that I did not want to stay on at that time to do research. At the very least, he felt I should go into secondary schools and teach biology. But I wanted to teach children, not subjects. So I went into a primary school and thoroughly enjoyed being a primary teacher.

Becoming a teacher

My first head teacher said that he appointed me for my science expertise and, as the school coordinator, I not only planned the school's science curriculum but also taught science with all children in the school, from the 4-5 year olds to the 11 year olds. Working with my husband, Professor Douglas Newton, we designed and had published a series of workcards for primary children that brought together the history of science and the primary curriculum, *Footsteps into Science,* published by Stanley Thorne. Each card focused on a scientist's life (e.g. Isaac Newton), a particular theme from his or her life (e.g. for Newton, that was light and colour) and then some cross-curricular activities that linked that theme to English, mathematics, art or other areas of the curriculum. I loved the way this integrated thinking brought ideas together, invited explanations and investigations, and applied ideas in new contexts.

I had already joined the Association for Science Education (ASE). I began to write for their professional journal, *Primary Science Review,* publishing ideas for teaching that I had tried in my own classroom. These were usually ideas that brought science and other curricular areas together. For example, one article described how to combine work on the Fibonacci series (mathematics) with an exploration of patterns in nature (science). Another discussed how to use the regular year by year growth of lichens (science) on gravestones in local churchyards (history, geography, mathematics) and reconstructing family life stories (English). It wasn't long before I was invited to speak at my first conference, the ASE annual conference which was that year in York. I was asked to talk about strategies to encourage children to record and communicate their science ideas and was told it would be an audience of about 30-50 primary school teachers. Imagine my horror to see the lecture theatre

full. I later learned there were over 200 people. But my talk was well received and I was now interested in the idea of bringing about change by raising awareness of alternatives based on research and practice.

Around this time, I was invited to join my local authority's advisory team as a primary science specialist. Initially, I had a seconded fellowship to develop learning resources for older primary pupils around the theme of *Plastics*. This was not the most exciting topic – creativity and imagination were definitely required on my part. These were also the days before the internet and Wikipedia so involved a lot of reading and practical work. The activities were primarily around ecology and the pollution caused by plastics, again using an integrated approach. There then followed a period helping teachers in primary schools to develop their school science curricula and demonstrating potential approaches.

Being an academic

My next step saw me move from working in schools to working in universities, where I have now spent over 30 years. I became a lecturer in primary science and technology education at Newcastle University, trained primary teachers, supervised their school placements and ran teacher development programmes in science and design technology (D&T). In the English National Curriculum these are two very different subjects, although in some countries D&T is treated as part of science –technology as science applied to solve problems.

The Head of Department at Newcastle, Professor Tony Edwards, encouraged me to register for a Ph.D. The topic I chose was *Teachers' Questioning for Understanding in Primary School Science*. With Tony as my mentor and supervisor, the next six years of my research life were mapped out exploring issues that brought together my interests. Using Johnson-Laird's mental model theory as my theoretical framework, I studied older primary school children and their teachers to explore the relationship between four different approaches used in the classroom to teach science: from a didactic information driven approach, to a totally practical work approach and two hybrid approaches in

between. Using three different science topics, I investigated the change in the learners' scientific understandings. Following this, I began to work with Doug (also an academic) on what teachers think counts as understanding in different disciplines. Together we gathered research data and published a number of papers, one for each area of the primary curriculum. At Newcastle I taught postgraduates and supervised doctoral students, and progressed through various teaching and administrative roles, including being Acting Head of School.

Then came the opportunity to work at Durham University, leading a new degree programme training teachers as primary science specialists. Working on this BScEd degree, I was able to bring together my knowledge and experience to support the development of the next generation of primary science specialist teachers.

Once again, I progressed through various teaching, research and administrative roles, leading teacher training and eventually becoming Head of School.

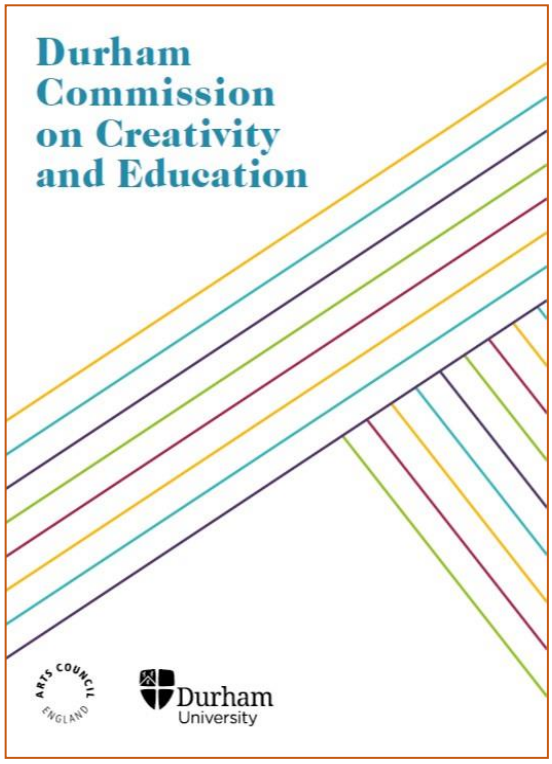
Doing research

My research began to shift more and more towards fostering creative thinking. Working with Doug and a research group of about a dozen colleagues (some academic staff from this and other universities and some doctoral students), we began to explore a shared interest in creativity. Reflecting our different subject specialisms, we collected data on primary teachers' notions of creativity in different disciplines. We identified their misconceptions, a general lack of awareness of opportunity to think creatively in disciplines other than arts, and major concerns about the assessment of creativity.

As a group, we published over a dozen papers and I produced a book that encouraged teachers to think about creativity in anticipation of the new 2014 (and still current) version of the English National Curriculum. In the book, *Creativity for a New Curriculum: 5-11* (Newton, ed., 2012), we worked our way through different areas of the curriculum with each chapter discussing first what research tells us about creativity in that subject and then giving ideas for effective practice.

The science part of this work was the first presentation I gave at an ICIE conference in Paris in 2008. The final full data were also the basis of a presentation at the ICIE Conference in Prague in 2013 and a summary was published as a monograph by ICIE (Newton, 2013). This was the beginning of my interesting and enjoyable involvement working with ICIE colleagues.

One of my doctoral students at that time (Dr Rebecca Chan, from Singapore - in the striped sweater in the picture above) was investigating very young pupils' drawings as a tool for assessing their ideas and creativity in science. Rebecca, with several other of my doctoral students, nominated me in 2013 for an award for *Excellence in Doctoral Supervision*, which was a great honour when I won. I still have doctoral students exploring aspects of creativity; one at the moment is looking at problem solving and problem finding in primary science; another is studying creative teaching; and a third has looked at engagement and creativity and has just successfully completed.



Most recently I have been involved in a major University collaboration with Arts Council England, a commissioned report on Creativity and Education which looked at the role that creativity and creative thought should play in the education of young people.

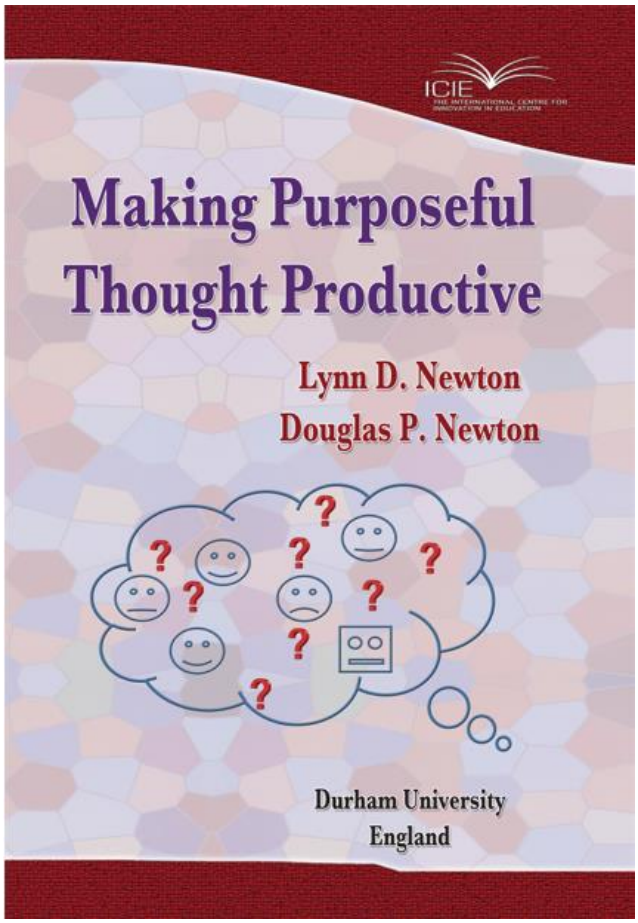
The collective knowledge of the Commissioners (Chair: Sir Nicholas Serota) has enabled the Commission to look beyond the immediate horizons of schools to the wider economic, societal and personal benefits of creativity. The Commission was convened in response to a growing consensus across business, education and public bodies that young people are emerging into a changing world in which they will need new skills and abilities to adapt when meeting extraordinary life-long challenges that require them to exercise creativity in their approach to life and work.

This has been demonstrated significantly in the current pandemic with its impact on families, schools and businesses. Over these last twelve months creative competence has become a pressing concern. The Commission explored the role of parents, creativity in the very early years, the place of digital technology in fostering creative thinking, and the impact of creative thinking on identity, mobility and wellbeing of young people. The report made ten recommendations and was launched in Westminster in November 2019.

Although the pandemic has slowed the implementation of some of the recommendations, I am still involved in developments and dissemination. I am working with a charity in Norfolk, *Into Opera*, to create and support internship projects to promote creativity in five primary schools in Norwich. This project is funded for two years and we have a programme of evaluation and teacher development. I am also acting as an adviser to several local authorities as they work to embed creativity in their schools. Within my own University, I gained funding to explore creativity within higher education disciplines generally, and within the STEM (science, technology, engineering and mathematics) curricula in particular. We are currently working on mathematics, but have already seen a book published on creativity in chemistry, a contract for one focussing on physics, and the biology version is in the planning stage.

My Head of School role leaves little time for teaching and research but I still do sessions on topics associated with creativity for our trainee teachers and convene a Masters' level module which I teach annually with Doug on *Purposeful Thinking*. About ten years ago we embedded our ideas from

across the years –work on questioning, understanding, creativity, emotions and thinking, and decision making - into a broader framework of purposeful, productive thought. We developed the module for our MA (Education) and MA (International) pathways and we have been teaching it to different groups since 2012. This module captures the essence of our holistic approach, presented in the book, *Making Purposeful Thought Productive* (Newton & Newton, 2018).



The module begins with an analysis of reproductive thinking (rote learning and memorization) and quickly introduces how to think productively. This includes how to teach for understanding; how to solve problems creatively; how critical evaluation can enhance the quality of thought; the relationship between emotions and thinking; and finally, how to think and to make decisions wisely. This year we include a focus on the impact of technology and artificial intelligence (AI) on purposeful thought.

I have had opportunities to work on creativity through some related projects that have arisen through international contacts. For example, the School of Education has for many years worked with the International School of Geneva (ISG), offering a PGCE (International) and a Masters' programme there. While in Geneva to work with our students, I gave several research seminars on creativity for the school staff. The ISG Director of Learning and Teaching at that time was Dr Conrad Hughes. He was working with Dr Clementina Acedo, the Director of the UNESCO International Bureau of Education, to develop principles for learning and competences for the 21st Century. I was invited to lead a staff development workshop on creativity and to contribute a paper on creativity as a 21st century competence to a special issue of the UNESCO journal, *Prospects* (Newton & Newton, 2014). I am also a member of the University of Utrecht's Creativity Consortium, joining the meetings and sharing ideas with like-minded colleagues. Participation in international conferences such as the ICIE conferences and the *Learning & the Brain* conference in Boston, USA which in 2018 focused on creativity, talent and potential, provide me with opportunities to take thinking into exciting new directions for me.

Looking back and looking forward

When I reflect on my own experiences across the years as both a learner and as a teacher, I see regular growth and change in my own ideas about teaching, learning and curricula. As we look back across the 20th century, we see educational systems that were designed initially to meet the needs of industrial societies and curricula that have emphasised particular types of skills, knowledge, understandings and attitudes. As we look forward in the 21st century, we have to ask, are these curricula still relevant? What will future adults need to know, understand and be able to do? If we have learned anything from the pandemic of the last year, it is that creativity and purposeful, productive thinking are crucial for adults of the future, those children in our classrooms today.

Here, in the School of Education, we recognise that training teachers as they used to be trained may no longer be fit for purpose. Apprenticeship models, in which trainees emulate practising teachers, no matter how good they are, are not in themselves sufficient. The world is changing so rapidly that tomorrow will not be like today. We have to future-proof our trainee teachers, so that they are flexible, adaptable and resilient, able to meet future needs and any demands for change they encounter. How can we ensure our trainee teachers of today can foster creative thinking in their classrooms of the future? I am encouraging the person in charge of our teacher training programmes to adopt this view and working with her to provide for teacher training that fosters not only teaching creatively but that fosters creative thinking across the curriculum. The UK government is introducing a new curriculum framework for teacher training and newly qualified teachers, the *Early Career Framework*. This is the beginning of what the government describes as the golden thread that is a teacher's progression from pre-service trainee teacher, through their early career, to being a subject or phase coordinator and eventually a senior leader. The skills, knowledge and understandings needed to follow this golden thread into an uncertain future are unclear. But for us in Durham, our golden thread is creativity – preparing our trainee teachers to teach creatively and teach for creative thinking.

For more experienced teachers, I am involved in the planning for and delivery of the first of the Creativity Commission's ten recommendations. This is the establishment of network of Creativity Collaboratives, groups of schools, colleges and universities, businesses, industries and cultural enterprises, parents, children and teachers all working together to embed creativity in the children's experiences. The schools collaborate with each other and with external partners to establish and sustain the conditions required for nurturing creativity in classrooms and across the school curriculum. This is not going to be easy – it will take effort and commitment.

My own secondary school's motto was *Nitendo Surgimus*, meaning "We rise by striving". But it can also be translated as "We grow through effort". I think this sums up my feelings about how creative thinking sits, as a very personal process, at the heart of purposeful, productive thought. And I still have my *Encyclopaedia of Nature* on my bookshelves, and look at it occasionally.

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