FutureEd 2017 Summit

How can findings from educational neuroscience reshape teaching and learning, now and in the future?

Thursday 9 February 2017, London, UK

Summit report, key messages and next steps

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About Learnus

Learnus is a community dedicated to bringing educators and those who specialize in the study of the brain, the mind and behaviour together in order to use the insights gained from high quality research to improve and enrich learning for all. It is our belief that learning and, by extension, teaching are at the centre of high quality education: **understanding how we learn is at least as important as defining what we should learn**.

About the Association of School and College Leaders

The Association of School and College Leaders (ASCL) speaks on behalf of members and acts on behalf of children and young people. ASCL is Britain's leading professional body representing over 18,000 school, college and system leaders, across the UK, including primary schools, multi-academy trusts and those working across phases.

A note on terminology:

Throughout this report, references to children and young people (CYP) should be read as including all young people of school age (5 to 18 years).

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Executive summary

"We need new ideas and especially we need to develop the science of teaching and learning. Understanding how we learn is at least as important as defining what we should learn. And to do that we need, of course, to understand the underlying mechanisms of learning as well as the behaviours, factors and context in which learning flourishes or indeed the things that impede or inhibit learning."

Becky Francis, Director of the UCL Institute of Education (Summit opening remarks)

Introduction

In recent years there has been a substantial expansion in our knowledge base that is increasingly being brought to bear on education. Recent advances in the field of neuroscience suggest that current teaching methods do not always minister very well to the learning needs of children and young people (CYP).

On 9 February 2017 Learnus and ASCL brought together teachers, school leaders, psychologists, neuroscientists, practitioners and researchers, to share and explore ways in which evidence-based educational neuroscientific findings might be used to improve educational practice and make an impact on CYP's learning. The conference was a tremendous success.

Conference themes

Each of the day's talks was distinct, and speakers came from a range of different backgrounds. Yet, upon attending the event, each delegate came to realise that understanding the process of learning itself requires an integrated multi-disciplinary approach which endeavours to examine the process from a wide range of perspectives: education, psychology, sociology, neuroscience and biology. The day was structured in order to encourage debate between the different communities of people represented and to find points of agreement between them. Thus a combination of presentations and round-table discussions was used in order to provide input as well as substantial opportunities for contributions from all delegates. Three themes framed the discussions during the day:

1. **Educational neuroscience: existing opportunities and challenges**
   Based on the inputs to FutureED alone, there is obviously a wealth of material that, when considered under the umbrella of educational neuroscience, has the potential to influence and reshape teaching and learning and to debunk the spread of neuromyths. Perhaps the biggest challenge is that of 'translating' the research findings and outcomes into practice and policy.
2. **Current practices in education: examples of the influence of educational neuroscience.**
   Reactions to the presentations emphasised the desire among teachers to understand why some approaches are more effective than others. It was also clear that individual teachers are already adapting their own approaches to teaching in a way that brought them more in line with evidence from educational neuroscience: encouraging pupils to 'stop and think' before answering a question; using questions more effectively to gain insights into how pupils have interpreted a situation; and thinking more carefully about the way in which they group pupils.
3. **Leading future developments: using findings of educational neuroscience more effectively to inform policies and practices.**
   The need for robust evidence on which to base practices and policies is extremely important but it takes time to assimilate, interpret and consider to what extent it should be implemented. Too often using and interpreting evidence is seen as an 'add-on' to

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existing workloads rather than being considered as a way in which to improve or replace existing practices. Creating an appropriate climate and culture in the school among staff and pupils alike in which 'learning' is the core activity. Using evidence to inform approaches to teaching as well as learning is an important part of building this culture.

Key messages

Overall what came across most strongly was a shared interest in increased dialogue and collaboration between researchers and practitioners. Two areas in particular areas were identified where important work can and should happen:

- **teacher education programmes**: a need to redress the balance of content of programmes to ensure that all teachers have an evidence-based understanding of learning supported by findings from educational neuroscience.
- **"whole school approaches"**: where possible, schools should adopt an approach towards introducing policies and practices informed by educational neuroscience. This means that schools should -
    - be prepared to challenge their own beliefs and existing practices;
    - start with small steps and ensure staff are well prepared;
    - involve pupils in the process at all stages;
    - look to embed the initiative into the School Development Plan;
    - recognise that the changes may be subtle adjustments to the practices of individual teachers and not necessarily major organisational changes.

Without doubt there are many teachers, researchers and others who are interested in the potential impact of educational neuroscience but all recognise there is much to do. This summit was but one very small contribution towards realising that potential.

FutureEd in a nutshell

Coming out of the day was agreement about the 'challenge' as well as five action points, which in their different capacities conference's delegates would endeavour to follow up.

The challenge

How to use the evidence generated by educational neuroscientific research effectively in order to inform and improve:

- the practices and policies of governments, in setting their education agenda;
- schools, in creating stimulating learning environments;
- teachers, in engaging and enthusing their students in learning;
- learners, in maximising their potential.

Actions points

- To build relationships between academia and schools – and between policy makers and parents.
- To lobby for educational neuroscience to feature in teacher training.
- To share messages of the summit and educational, and to develop readily available and easily accessible tools and materials.
- To strengthen educational neuroscientific research in schools.
- To encourage evaluation to build a rigorous evidence base and to debunk neuromyths.

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FutureED 2017 summit: key messages

1. There is strong interest in exploring the potential and actual impact of educational neuroscience among teachers, psychologists, neuroscientists and policy-makers, researchers and practitioners but in all communities there is much to learn.
2. From the teachers' perspective, there is a need for easier access to information in order to build up their knowledge and understanding in order to:
    - recognise and counter the 'falsehoods of neuromyths';
    - better understand the overall functioning of the brain;
    - provide evidence to support existing good practices and challenge approaches that don't work;
    - explore potential developments by collecting and interpreting appropriate evidence either first-hand or through secondary sources.
3. From the researchers' perspective, there is a need for:
    - better understanding of the range of educational contexts and demands on teachers and other staff;
    - working with teachers through increasing dialogue in order to:
        - develop a shared understanding of the language (and jargon) used within and between communities;
        - generate appropriate research questions for further investigation through methodologies that are both reliable and valid.
4. There is a need to redress the balance of content in teacher education programmes (both initial teacher education and continuing development) in order to ensure that teachers have an evidence-based understanding of learning supported by findings from educational neuroscience.
5. Where possible schools should adopt a 'whole school' approach towards introducing policies and practices informed by educational neuroscience. Embarking on such an approach schools should:
    - be prepared to challenge their own beliefs and be open to considering new ideas even when these are counter to existing practices;
    - start with small steps ensuring that staff are well prepared;
    - involve pupils in the process at all stages including defining the problem and evaluating potential solutions;
    - look to embed the initiative, and its outcomes if appropriate, into the school development plan;
    - recognise that the changes may be subtle adjustments to the practices of individual teachers and not necessarily major organisational changes.

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FutureEd 2017 Summit: next steps

The summit identified five action points:

1. Steps should be taken by all parties to share messages from the summit, and educational neuroscience more generally, through a wider range of channels including the use of social media and the development of readily available and easily accessible trustworthy materials.
2. There should be increased efforts to build relationships between academia and schools in this field. The discussions should also involve policy-makers and parents where possible.
3. Initial teacher education providers should include more educational neuroscience in their programmes – it should be part of the requirements. This should be supported by the development of modules to support trainees and recently qualified teachers in strengthening their knowledge of the role of the brain in learning.
4. The use of research in general and educational neuroscience specifically should be strengthened in schools through:
    a. developing stronger working partnerships between researchers and practitioners more widely;
    b. encouraging more robust evaluation of evidence in order underpin a rigorous evidence-base and to debunk neuromyths.
5. Working with the support of other groups schools introducing approaches informed by educational neuroscience should:
    a. undertake a needs analysis of both the school and its pupils;
    b. build proposals into its development plan;
    c. maximise enthusiasm for ‘action research’ to explore and test the new developments.

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Introduction: the challenge

Learning and, by extension, teaching are at the centre of high quality education. Understanding how we learn is at least as important as defining what we should learn. To do this we need to have an understanding of the underlying ways in which the brain functions, the behaviours and environments that enable learning to flourish, and the practices which restrict or, at worse, inhibit learning. There is no 'silver bullet', and educational neuroscience should not be seen as a panacea; however, in recent years there has been a substantial expansion in our knowledge base – biological, psychological, sociological etc. – that is increasingly being brought to bear on education.

Developments in educational neuroscience have not always been accompanied by good practices. Despite claims to the contrary, many initiatives are not supported by robust evidence and new knowledge has not always been used appropriately. All too often research and development is being undertaken in isolation so that findings from one discipline are not related to those of other relevant areas of study.

Understanding learning requires a more integrated multi-disciplinary approach, such as that adopted by 'educational neuroscience' which endeavours to examine the process of learning from a wide range of perspectives: education, psychology, sociology, neuroscience and biology. Together these various disciplines are able to enhance our understanding of learning and the conditions which enable young people to progress, but the challenge doesn't end there. A further step has to be addressed, sooner rather than later **– the major challenge is how best to use the evidence generated by the research to inform and improve the practices and policies of:**

- **governments, in setting their education agenda;**
- **schools, in creating stimulating learning environments;**
- **teachers, in engaging and enthusing their students in learning;**
- **learners, in maximising their potential.**

FutureED 2017 set out to address this challenge by asking the question: *"How can findings from Educational Neuroscience Reshape Teaching and Learning, now and in the Future?"*

Aim of the summit

This unique summit brought together teachers, school leaders, psychologists, neuroscientists, practitioners and researchers, to share and explore ways in which evidence about how we learn can be used more effectively to improve educational practice and make an impact on young people's learning. In particular it endeavoured to:

- identify opportunities and challenges offered by findings from research in the field of educational neuroscience;
- provide examples of ways in which research evidence is currently being used to inform educational practices;
- propose ways in which the findings of educational neuroscience research can be used more effectively to inform policy and practice, and improve teaching and learning.

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Themes of the summit

FutureED 2017 was structured in order to encourage debate between the different communities of people represented. Three themes, as reported below, were developed during the day:

1. Educational neuroscience: existing opportunities and challenges.
2. Current practices in education: examples of the influence of educational neuroscience.
3. Leading future developments: using findings of educational neuroscience more effectively to inform policies and practices.

1. Educational neuroscience: existing opportunities and challenges

"Educational neuroscience" is a relatively young field of study that provides a platform on which ideas and evidence drawn from a wide range of disciplines can be examined together, rather than the individual elements being considered in isolation. It also provides a platform for bringing together individuals with different backgrounds and expertise to debate issues and work towards a common understanding of the problems that have been identified and make progress towards potential solutions. FutureED 2017 Summit was called to form part of this multi-disciplinary platform.

In his keynote presentation Paul Howard-Jones reflected on his review[1] of how close or distant findings from neuroscience were from being applied to the classroom. Using a two-scale measure based on strength of evidence and the likely length of time for further development, he provided a set of examples, each of which appeared to have potential to improve the process of learning.

Some of these items had been tested in laboratory conditions and could be implemented in classrooms with little or no specialist resources, such as: increased use of exercise; computer-based training focused on phonological skills; and the effect of spacing learning on memorisation of ideas. Other items had shown promise in laboratory conditions but required a much longer timescale for development e.g. the use of transcranial direct current stimulation.

The indications are that there is a wealth of research which may have potential to influence educational practices and policies. However many of the areas require further development and, crucially, testing 'in the field' as to their effectiveness beyond the laboratory. Six projects funded by Education Endowment Foundation and the Wellcome Trust[2] in the UK were cited as examples of such trials:

- *Fit to Study:* examining the effect of exercise on academic achievement
- *Spaced Learning:* an intensive teaching approach where content is taught multiple times with breaks in between presentations.

[1]Howard- Jones, P. (2014) Neuroscience and Education: A Review of Educational Interventions and Approaches Informed by Neuroscience. Available at: https://educationendowmentfoundation.org.uk/public/files/Publications/EEF_Lit_Review_NeuroscienceAndEducation.pdf (Accessed August 2017)

[2] In 2014, the Wellcome Trust and the Education Endowment Foundation launched the Education and Neuroscience Initiative https://wellcome.ac.uk/what-we-do/our-work/understanding-learning-education-and-neuroscience

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- *Teensleep:* the impact of sleep education on academic achievement and wellbeing.
- *Learning Counterintuitive Concepts (The UnLocke Project):* using techniques that improve pupils' ability to 'inhibit' prior contradictory knowledge when learning new concepts in science and maths.
- *GraphoGame Rime:* improving pupils' literacy through teaching phonics via 'rhyme analogy.'
- *Engaging the Brain's Reward System* exploring the impact of uncertain rewards – the opportunity to double or lose points - in secondary school science classes.

Daphne Bavalier, in her keynote presentation, examined the problem from a very different perspective: she explored the impact of action video games on learning and brain plasticity. The action video games used in her study were not those designed for 'learning' specifically. The extensive research findings she presented challenged the common perception that 'video games are bad' and demonstrated that playing such games could have beneficial effects on behaviours such as contrast sensitivity of vision, mental rotation of images and attentional control. Furthermore, Professor Bavalier's studies appeared to show wider transfer-benefits with games players, for example, being better at selecting relevant information for the task in hand and ignoring distractions when the task is difficult.

Evidence from further studies related to academic / work performance and the use of technology also indicated that there are benefits to be had for developing learning. This is not without risks but in essence closer examination of behaviours that involve the use of technology can have benefits which are not immediately obvious and which are at times counter-intuitive. As one delegate stated,

> *"It's hard to take on new ideas. Video games are a perfect example. Even while I am listening and thinking this is interesting, my instinct is that this can't be right – my pre-conception."*

Based on the inputs to FutureED alone, there is obviously a wealth of material that, when considered under the umbrella of educational neuroscience, has the potential to influence and reshape teaching and learning. It is also clear that much of the evidence is unlikely to have a direct impact immediately and some is unlikely to have any influence at all. The content and tenor of the round-table discussions throughout the summit emphasised perhaps the biggest challenge as to how educational neuroscience might affect teaching and learning – that of 'translating' the research findings and outcomes into practice and policy.

Overall there was a very positive response to educational neuroscience and the potential for informing policy and practice, reflecting a growing interest in the field from teachers. However, this was tempered by the possible obstacles, perceived or otherwise, that were identified, including:

- the practical issues of day-to day life in schools – time, resources, restrictions arising from the curriculum and accountability regimes;
- the perceived conflict between the need to 'get students through exams' and the desire to enthuse and enable students to learn and achieve;
- the low levels of awareness of, and access to, up to date information in the field of educational neuroscience and how that might be related to teaching and learning;

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- the tension between the desire for evidence-based / informed decision making and the time to evaluate and prioritise the relative merits of different approaches;
- the lack of a shared understanding between different groups of people – in terms of terminology, practice, and the quality and robustness of evidence;
- the need for experience in interpreting research findings and being able to identify false or misleading claims (including potential neuromyths) that promote particular methods;
- the tendency to treat individual disciplines in isolation rather than recognising the relationships between different types and sources of evidence;

Although there are many teachers (and others) who support the idea of using educational neuroscience evidence and allow it to inform what they do, there is also a large number who are resistant to change. For some teachers, and in part this comes as a result of the prominence of neuromyths, educational neuroscience is considered 'just another fad'. Thus there is a feeling that in some cases this has to be addressed before steps can be taken to overcome the barriers indicated. Despite the drawbacks outlined above, as the next section of the report indicates, there is progress being made towards recognising and realising the potential of educational neuroscience.

2. Current practices in education: the influence of educational neuroscience in the school / classroom

A significant moment in recognising the potential of educational neuroscience to contribute to improving education in the UK, was the call for proposals from EEF and Wellcome Trust, to conduct trials of interventions the were based on evidence from neuroscience (see list on page ?).

Denis Mareschal in his presentation explained the genesis of one of these major programmes, the UnLocke Project, which is examining the role of 'inhibition' in the learning of counter-intuitive concepts in science and maths in primary age children. Based on a body of knowledge derived from a combination of research in psychology and neuroscience the project has developed a learning activity which encourages young children to 'stop and think' before answering the questions put to them.

The hypothesis is that: in encouraging CYP to 'stop and think', they will develop an ability to inhibit their incorrect intuitive ideas, in order to consider new evidence or information, that may be counter-intuitive, but leads them towards the correct explanation. The main trial will use Y3 and Y5 children from one hundred primary schools across England. This is planned for Autumn 2017 and Spring 2018.

Insights gained from this the other EEF/Wellcome projects will allow researchers not only to assess the strength of the hypotheses but also to draw conclusions about the practical, intellectual and cultural issues involved in conducting large-scale randomised control trials.

In their presentation, Alice Jones Bartolli and Tara Deakes illustrated how by working together over a period of time researchers and teachers can effect significant change in school policies and practices. The school in question, which is a specialist centre for children with behavioural difficulties, recognised they we not making progress using their existing approaches; indeed they felt things were getting worse and 'more of the same' was actually contributing to the downward trend. Working with the researcher they became familiar with

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evidence of the way in which executive functions interacted with social and emotional factors to impact on children's behavioural difficulties. More importantly the teachers realised that many of their actions, including the use of rewards and sanctions, actually contributed to the behavioural problems.

In the light of this new knowledge, the staff took the difficult decision to change the way the school was organised and the way adults worked and interacted with the CYP. A new focus was placed on meeting the actual needs of CYP through a number of initiatives:

- the development of a specialist learning curriculum;
- the involvement of CYP in decision-making about their learning;
- the grouping of CYP according to their needs profile not their age.

Of course the new approach has not run completely smoothly. It is still, one might say, a "work in progress" but the school is now seen to work better for its CYP. Staff now describe their approach to education in the context of educational neuroscience, as Tara Deakes remarked, *"we base our provision on a deeper understanding of the neuroscience-based profile of needs of each child."*

During the round-table discussions there were very few examples of well-defined practices based on educational neuroscience. Many delegates acknowledged their lack of awareness and understanding of the research underpinning learning, noting that the majority of today's teachers have never encountered any educational neuroscience at all during their initial training or since. For this reason, there were numerous calls for improvements in teacher education, both in pre-service training and continuing professional development.

It was evident that the educational neuroscience referred to by speakers and others resonated with the participants. Although most teachers would acknowledge the need to consider children as individuals, they feel unable to respond positively in situations beyond their experience. Behavioural issues featured strongly in this context and examples were cited where schools had adopted approaches to reduce the 'escalation of confrontation' between individuals. Involving pupils in developing behaviour policies was also referred to as an approach to engage pupils in taking responsibility for their actions and learning. Strikingly, in most of the cases cited during the discussions, the actions taken had been introduced without reference to any underlying research evidence. They were practices that had been identified as 'working elsewhere' and so 'taken on-board' in the expectation they would be successful in the new situation. Unfortunately, they were never as successful as had been anticipated.

Another reaction to the presentations was summed up by the comment, "we can't do what Alice and Tara did!". However, despite this negative statement the discussions tended to illustrate positive responses. These were in the form of examples of individual teachers who had adapted their own approaches to teaching and interacting with pupils in a way that brought them more in line with evidence from educational neuroscience: encouraging pupils to 'stop and think' before answering a question; using questions more effectively to gain insights into how pupils have interpreted a situation and /or what this know about a particular topic; thinking more carefully about the way in which they group CYP. Reactions to this presentation again emphasised the desire among teachers to understand why some approaches are more effective than others.

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3. Leading future developments: using findings of educational neuroscience more effectively to inform policies and practices

In her presentation, Leora Cruddas put the overall challenge in context when she argued that, in England, education policy had moved from The Education (1994) Act which stated simply that CYP should 'learn' to The Education Reform Act (1988) which set out, through the introduction of a National Curriculum, **what** CYP should learn. She urged that we should now be developing a new, evidence-based act with an emphasis on **how** CYP learn. The findings from educational neuroscience can play a significant role in making learning more effective and, amongst other things, reducing education inequality.

Paul Howard-Jones asked what might be the most appropriate model for introducing educational neuroscience into the classroom. He suggested that the mainly 'top-down model' adopted for most educational developments may not. Although it may be able to demonstrate the effectiveness of specific practices, the variety of contexts in which teaching and learning take place often reduce the replicability of such practices. Furthermore he argued that implementing individual practices in isolation may not, in themselves, show a sustained impact, as there are many other factors that may have more influence on the learning that is taking place.

Judith Enright in her presentation added to this thought when she stated, *"Teachers are always getting answers to questions they didn't ask."* In this way, she emphasised the need for greater dialogue between teachers and researchers and for greater understanding as what and how educational neuroscience can contribute to raising the quality of education.

As several speakers and participants reminded everyone, the need for robust evidence on which to base practices and policies is extremely important but it takes time to assimilate, interpret and consider to what extent it should be implemented. Too often using and interpreting evidence is seen as an 'add-on' to the existing workload rather than being considered as a way in which to improve or replace existing practices. Creating an appropriate climate and culture in the school among staff and pupils alike in which 'learning' is the core activity. Using evidence to inform approaches to teaching as well as learning is something that ought to come naturally; it is not something that can be done only when the 'marking' is finished. An important part of building this culture is sharing current thinking with pupils about how they learn – it is not realistic to expect them to "just pick it up".

A key element of the culture in a school is that it is a 'safe environment' in which learning takes place. This applies to both pupils and staff, and it requires that they feel able to take risks, make mistakes, link ideas that may or may not appear to be related, step back to look at the big picture and not be forced to focus only on immediate demands or minute details. Being encouraged to recognise the fundamental principles and to be able to apply knowledge and experience to new situations become part of the learning process.

The day's discussions raised many of the issues that schools, as well as the wider education system, face. Often these are barriers to thinking about teaching and learning in a more constructive and long-term manner. Certain issues came up again and again: potential conflicts with examination requirements, leagues tables, Ofsted criteria, and the limitations of school budgets.

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What is more, the discussions also made clear that for successful implementation of findings from educational neuroscience, a better informed workforce was needed, as well as mechanisms for accessing and disseminating information. It was further emphasised that, in considering, and ultimately adopting, approaches to teaching and learning more firmly based on evidence from educational neuroscience, schools should be clear about *why* they want to do this.

Conclusion

In his reflections on FutureEd 2017 Michael Thomas, reminded participants that the question being addressed was complex, multi-faceted and multi-layered. It involved looking at the evidence and its implications at different levels, that of: individual pupils (as well as teachers, researchers, and policy-makers), schools and organisations, and the education system as a whole. The evidence that has and is being accumulated is of a range of types – hence the need for the multi-disciplinary approach under the educational neuroscience umbrella.

There exists substantial information based on behavioural, psychological and sociological studies which provide a useful basis for some good practices that are already in place and on which further improvements could be made.

The unique contribution of the neuroscience is in working to identify the mechanisms by which the brain and the mind bring about learning in all its forms. However, identifying causal effects is proving to be a major challenge. As has been stated frequently there are no silver bullets rather there are many small contributions which come together resulting in patterns of learning. Therefore, in considering how educational neuroscience might reshape teaching and learning, now and in the future, recognising the importance of the overall context is important. For example, it suggests that teachers (unless of course they want to) don't have to have a detailed knowledge of the cellular structure of the brain. Rather they perhaps need an understanding of its overall pattern of development, its structure, how it functions as a unit, and ways in which individual brains can vary causing different outcomes, some subtle and others more obvious. This combined with understanding from other aspects of educational neuroscience (e.g. executive functions and memory) could be a starting point for teachers looking to inform their pedagogy and improve their practices.

Without doubt there are many teachers, researchers and others who are interested in the potential impact that educational neuroscience could have on teaching and learning but all recognise there is much to do. This summit was but one very small contribution towards realising that potential.

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APPENDICES

FutureED 2017: programme

09.00 Registration – coffee and networking

Chair: Professor Andrew Tolmie, UCL-Institute of Education

09.30 Opening of the conference
- Professor Becky Francis, Director, UCL-Institute of Education, London

09.45 Keynote 1: *Action video games as an exemplary learning tool.*
- Professor Daphne Bavelier, University of Geneva, Switzerland, and University of Rochester, NY, USA

10.30 Round-table discussion 1: *A focus on some implications for pedagogy*.
Speakers:
- Professor Denis Mareschal, Birkbeck College London
- Kate Atkins, Head teacher Rosendale Primary School, West Dulwich, Lambeth, London

11.30 Coffee

11.45 Round-table discussion 2: *A focus on special situations – behavioural challenges.*
Speakers:
- Dr Alice Jones, Goldsmiths London
- Steve Baker, Executive Headteacher, Kilgarth School, Birkenhead, Merseyside

12.45 Lunch

Chair: Richard Newton Chance

13.30 Keynote 2: *Implementing Educational Neuroscience for educational progress: Do we need an "education first" approach?*
- Professor Paul Howard Jones, University of Bristol

14.15 Round-table discussion 3: *A focus on leadership of developments.*
Speakers:
- Leorra Cruddas, Director of Policy and Public Relations ASCL
- Judith Enright, Headteacher, Queen's Park Community School, Brent, London

15.15 Tea

15.30 Final round-table discussions: *Identifying main messages / questions for further development*.

16.00 Feedback from groups

16.15 Reflections on day: *some key messages*
- Professor Michael Thomas, Director of Centre for Educational Neuroscience, London

16.30 Conference ends

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FutureEd 2017: Titles and abstracts of the presentations
Abstracts

Keynote Presentation 1 (09.45 -10.30)

Action video games as an exemplary learning tool
Daphne Bavelier

Action video game players outperform their non-action-game playing peers on various sensory, attentional and cognitive tasks. A training regimen whose benefits are so broad is rather unprecedented and provides a unique opportunity to identify factors that underlie generalization of learning and principles of brain plasticity. We propose that a common mechanism is at the source of this wide range of skill improvement. In particular, improvement in performance following action video game play results from greater learning to learn abilities. Practical applications from education to rehabilitation will be discussed.

Keynote Presentation 2 (11.45 – 12.30)

Implementing Educational Neuroscience for educational progress: Do we need an "education first" approach?
Paul Howard-Jones

Educational neuroscience aspires to undertake research relevant to improving educational practice. There are several processes that might be pursued in attempts to transfer scientific knowledge about learning to the classroom. These all lie at different points along a classic push-pull scale of design, with interventions "pushed" by new scientific insights at one end, and activities pulled by educational demand at the other.

This raises some interesting questions: To what extent should Educational Neuroscientists address and make themselves relevant to current educational perspectives, current issues, contexts, aims/motivations and opinions, and to what extent should they focus on the realization and application of fundamental scientific research? Is change more likely through developing new novel interventions or through seeking and promoting a scientific understanding of current effective teaching practices, so enabling better adaptation and implementation of these practices?

Round-table discussion 1: a focus on some implications for pedagogy (10.30 – 11.30)

The UnLocke Project: From inhibition in the brain to math and science in the classroom
Denis Mareschal

Learning something new often involves overcoming prior experience or beliefs. Recent neuroimaging work suggests that experts are better at inhibiting prior naive beliefs when reasoning in scientific domain than novices. I will discuss the evidence behind this and describe a primary school maths and science learning activity designed to promote the better use inhibitory control skills in maths and science lessons

What Does it Look Like?
Kate Atkins

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Why do schools resort so often to quick fix, evidence poor solutions to school improvement? How do we connect research and evidence and classroom practice? How can we develop schools, classrooms, teachers and learners that have a creative, flexible, problem-solving approach to embedding research in their pedagogy? Kate Atkins will provide a whistle stop tour of how Rosendale Primary School has attempted to answer those questions.

Round-table discussion 2: a focus on special situations – behavioural challenges. (13.15 – 14.15)

Working collaboratively in research-based education – an SEMH perspective
Alice Jones Bartoli and Tara Deakes

We will focus on collaborative and on-going work with children who are characterized by social, emotional and behavioural difficulties (SEBD), all of whom are being educated outside of mainstream school. This paper will cover i) research that aims to understand the cognitive and affective factors underpinning difficulties in behaviour, and ii) how this research can inform school-based practice.

We will present some of the current thinking about the neurocognitive profiles that are often associated with SEBD, alongside some of the changes to the everyday running of one school. The school-based programme focuses on a reward-based system that scaffolds and promotes positive behaviour through: individual and group work; target-setting, and adaptations to curricula. Quantitative data was collected using teacher-reports on behaviour using standardized measurement tools.

Results suggest improvements in behaviour and aggression, and better emotional understanding and communication in students. Teachers and students also report more positive feelings about school.

We suggest that school-based behavioural systems that take into account these differential developmental trajectories, and targets the known strengths and weaknesses of groups of children with severe difficulties will result in more effective intervention programmes.

Round-table discussion 3: a focus on leadership of developments (14.15 – 15.15)

The future has already arrived. It's just not evenly distributed yet.
Leora Cruddas

My presentation will consider the leadership challenges of (re-)distributing the future, such that our education system is defined by both quality and equality. Beliefs about innate intelligence run deep in our culture and our language. The challenge is to liberate ourselves from these "mind-forg'd manacles." Achievement can be realised at scale for all children and young people. We must reject determinism either by social background or by perceived intelligence.

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How can school leaders move from 'what works?' to 'what works, how and why?'
Judith Enright

Over the past few years the Research ED movement and the developing role of the school Research Lead have enabled schools to engage more with research and make evidence-informed decisions. The ResearchED movement's mantra is "working out what works", with a particular mission to debunk educational snake oil such as learning styles or brain gym.

All staff at Greenford High School were challenged to be "Researching Teachers", with one group led by Jeremy Dudman-Jones, a Learnus Council member who is a senior leader at the school. We also benefitted from after school neuroscience sessions led by academics who helped us discuss the theory and consider practical applications for our classrooms. We found that "what works" can only be achieved through a lot of considering how and why, supported by a coaching programme to make it work in the classroom.

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FutureEd 2017: Speaker biographies

Kate Atkins is Headteacher of Rosendale Primary School an 'outstanding' three form entry school with three Children's Centre. Kate Atkins has been teaching in Lambeth for over 20 years. Although she has taught across the primary age range, her specialism and her passion is in Early Years. Before she went into teaching, Kate worked for newspapers and theatre companies before teaching in Madrid for two years. Kate has a passion for sport and was one of the performers in the Opening Ceremony of the 2012 London Olympics. She is a committed lifelong learner and has recently passed her gold medal in Latin dance with Honours. Given this, it is not surprising that Rosendale Primary School is bursting with innovation. The school library is housed in a double decker London bus, the children broadcast a weekly radio show, the children learn Mandarin as well as French and the school was awarded Confucius Classroom of the Year. The staff have run two national research projects funded by the Education Endowment Foundation and the LSEF. Kate is a Leading Thinker for the National Education Trust.

Daphne Bavelier is an internationally-recognized expert on how humans learn. In particular, she studies how the brain adapts to changes in experience, either by nature - for example, deafness - or by training - for example, playing video games. Initially trained in Biology at the 'Ecole Normale Superieure de Paris', she then received a PhD in Brain and Cognitive Sciences from MIT and trained in human brain plasticity at the Salk Institute. Her work shows that playing fast-paced, action-packed entertainment video games typically thought to be mind-numbing actually benefits several aspects of behaviour. Exploiting this counter-intuitive finding, her lab now investigates how new media, such as video games, can be leveraged to foster learning and brain plasticity. Daphne Bavelier now directs a Cognitive Neuroscience research team at the University of Geneva, Switzerland. Her expertise is also sought outside of academia. She is a co-founding scientific advisor of Akili Interactive, a company which develops clinically-validated cognitive therapeutics that exploit video games, a steering committee member on the World Economic Forum's global agenda project "New Vision for Education: Unlocking the potential of technology", and a member of the World Economic Forum Global Future Council on Human Enhancement.

Derek Bell is a teacher, researcher, advisor and advocate for improving and enriching education for all. He worked in schools and universities before becoming Chief Executive of the Association for Science Education (ASE) and Head of Education at the Wellcome Trust. He remains very active in education, nationally and internationally, through his consultancy (Campanula Consulting), committee and advisory work and has a wide range of publications. He was appointed Professor of Education in The College of Teachers in 2007 and awarded an honorary Doctorate of Education by Manchester Metropolitan University in 2011. Derek is Director of LEARNUS and a visiting research associate at UCL Institute of Education, London.

Leora Cruddas is Director of Policy and Public Relations at the Association of School and College Leaders. She is responsible for the Association's policy formation, relationship management and public relations engagement with senior politicians, civil servants, opinion formers and policy makers. An English teacher by training, Leora was previously a director of education in two London local authorities. She has written two books and published in many education journals. Her primary research interests relate to voice and engagement. As ASCL's director of policy, Leora is the author of ASCL's Blueprint for a Self-Improving System.

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Tara Deakes has been teaching for over 20 years within the Primary sector, starting in Early Years, in a high deprivation area of South Wales then moving to Westfield School Bourne End (SEMH special school provision). Over the last 10 years, her role at Westfield has changed significantly as the pupil profile has altered. Her involvement in neuroscience based research has significantly impacted upon her own practice and she has led the change in whole school culture and practice through training and the development of the neuroscience based Specialist Learning Curriculum. She also provides training and support for other professionals and parents in addressing pupil needs from this perspective.

Judith Enright was an accountant with Reuters Ltd before training to be a teacher. After being Head of ICT in a London Catholic comprehensive, Judith was a consultant for the National Strategies in The Royal Borough of Kensington and Chelsea. Part of the team that set up Chelsea Academy in 2010, Judith then joined Greenford High School where she became Deputy Head for Teaching, Learning and Assessment. Judith recently achieved an MSc in Research for Public Policy and Practice at UCL/IoE. As the new headteacher at Queens Park Community School Judith is developing a culture of questions, coaching and care.

Becky Francis is Director of the UCL Institute of Education (IOE). Before this, she was Professor of Education and Social Justice at King's College London. She has followed a research career focusing on education and social justice, incorporating education policy work, for example in her previous roles as Director of Education at the RSA, and as Standing Advisor to the Parliamentary Education Select Committee. Becky is best known for her work on gender and achievement. Her policy research and analysis has focused particularly on school quality, and academies policy, in relation to social equality. Her academic expertise and extensive publications centre on social identities (gender, 'race' and social class) in educational contexts, social in/equality, and social identity and educational achievement, and gender theory. She is currently directing the Education Endowment Foundation-funded project 'Best Practice in Grouping Students', a mixed methods study involving 140 English secondary schools, investigating attainment and non-attainment grouping in relation to social inequality.

Paul Howard-Jones is Professor of Neuroscience and Education at the Graduate School of Education, University of Bristol, where he leads the MSc (Education) pathway in Neuroscience and Education. Recent research has focused on games-based learning. Prior to his research career, he was a secondary school teacher, then a trainer of teachers and inspector of schools. He was a member of the UK's Royal Society 2011 working group on Neuroscience and Education and authored one of the first text books in this area ("Introducing Neuroeducational Research"). His new book "A Brief History of Your Learning Brain" will be published in 2017 by Routledge.

Alice Jones Bartoli is the Director of the Unit for School and Family Studies at Goldsmiths, University of London. Most of Alice's work focuses on understanding young people with social, emotional and behavioural difficulties, which she explores in multi-disciplinary ways, using neuroscience, behavioural genetics and neuropsychological methods. Funded by ESRC, Nuffield Foundation and the National Autistic Society, Alice's work seeks to delineate different cognitive and affective profiles associated with social, emotional and behavioural difficulties at school. Most recently, Alice has sought to use our existing knowledge of these

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difficulties to co-create bespoke school behaviour programmes, which are so far yielding positive results for students and teachers alike. Alice is also the current Editor of the British Journal of Educational Psychology.

Denis Mareschal obtained a BSc in Natural Sciences (Math and Physics) from the University of Cambridge, then an MA in psychology from McGill University in Montreal, finally obtaining a DPhil in Psychology from Oxford University. He has spent the last 30 years studying the mechanisms of learning across infancy and childhood. He has been awarded prizes from the International Society for Infant studies (USA), the Cognitive Science society (USA) and the British Psychological Society for his work on early learning and development. He is co-editor of a recently published book entitled *Educational Neuroscience*, which tries to bring together the latest findings in cognitive and brain sciences to ask how this might impact on classroom practice. He is a founding member of the *Centre for Educational Neuroscience* and co-director of the *Centre for Brain and Cognitive Development*. Finally, he also regularly tutors and delivers maths lessons in local London primary schools.

Richard Newton-Chance was, until August 2014, Principal of Queen Elizabeth's School in Crediton, Devon. This is a 1400 student split-site 11-18 converter academy and the only state boarding school in Devon. He trained as an English teacher, but fell into IT in the mid-eighties. He has variously been a curriculum lead, time-tabler, IT lead, building specialist and Chair of Devon Association of Secondary Heads. On retiring from QE, he took up the post of Funding Specialist for ASCL, for whom he still works as a funding consultant. He has been involved in Learnus for several years now, principally because he is "fascinated to discover how developing knowledge of how the brain works can impact on teaching and learning".

Michael Thomas is a Professor of Cognitive Neuroscience at Birkbeck, University of London, UK, and Director of the University of London Centre for Educational Neuroscience. His current work in educational neuroscience includes understanding the role of inhibitory control in children's science and math learning, investigating the influence of cell phone use on teenage brain development, linking findings on sensitive periods in brain development to their educational implications, and building links between genetics, environment and education.

Andrew Tolmie is Chair of Psychology and Human Development at the UCL Institute of Education, University College London. He is also Deputy Director of the Birkbeck/UCL Centre for Educational Neuroscience and Programme Leader for the joint Birkbeck/UCL MA/MSc in Educational Neuroscience. He was Editor of the *British Journal of Educational Psychology* from 2007-12. He is a developmental psychologist with longstanding interests in the growth of children's implicit and explicit conceptual representations, their behavioural skills, and the relationships between these, particularly in the elementary school age range. Most of his work has focused on educationally-relevant topics and settings, with a substantial emphasis on science learning, but also on the acquisition of road-crossing skills among children. He is currently lead for UCL on a large-scale randomised control trial funded by the Educational Endowment Foundation and the Wellcome Trust, testing a method of promoting inhibitory control in the learning of counterintuitive concepts in science and mathematics.

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