# Educators' Views on the Role of Neuroscience in Education: Findings From a Study of UK and International Perspectives

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ABSTRACT—This report summarizes findings from a study of educators' views on the role of the brain in education. Responses were sought using questionnaires ($n$ = 189), followed by a smaller number of in-depth interviews ($n$ = 11). Results show a high level of enthusiasm for attempts to interrelate neuroscience and education, although conceptualizations about what this entails differ widely. Findings suggest that communication with practitioners may become a key factor influencing the success of attempts to enrich classroom practice with scientific understanding about the brain and mind.

## BACKGROUND

In the opening issue of this journal, Fischer et al. (2007) made the important point that "research must move beyond the ivory tower into real-life settings ..." and that "answering any key questions about mind, brain, and education requires reciprocal interaction between scientific research and practical knowledge of educators and caregivers." An important component of such interaction is a commitment to understand the perspective of those participating. During 2005 and 2006, we led two complementary initiatives intended to support the emerging interaction between neuroscience and education: a seminar series and a consultation with educators.

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The seminar series was entitled "Developing Collaborative Frameworks for Neuroscience and Education" (Howard-Jones, 2007). Six 1-day seminars were held in locations across the United Kingdom, and an invited audience of teachers, psychologists, neuroscientists, and policy makers heard presentations and took part in discussions on the subject of interrelating neuroscience and education. Discussions were held in small groups (with representatives from all the different stakeholder groups included) and were guided by provocative questions such as "By what routes should neuroscience enter the classroom?" During this part of the seminar, delegates were encouraged to share their views in an atmosphere of mutual respect. After each event, discussants contributed to producing summaries that helped clarify the issues that arose (available at https://www.bris.ac.uk/education/research/sites/brain/docs).

As the seminar series was underway, we also undertook a study designed to support seminar discussions and provide discussants with a general profile of educators' current views on the role of the brain in education. This study involved 200 educators and took the form of a large-scale questionnaire study ($n$ = 189), followed by a series of in-depth interviews with classroom teachers ($n$ = 11). In this brief research report we present a short discussion of the perceptions of educational practitioners as they engaged with the idea of bringing mind, brain, and education together. A more detailed account of the findings of this study can be found in Howard-Jones and Pickering (2006).

In seeking to learn more about the views of educators in the United Kingdom, the questionnaires were distributed to participants in contexts in which the issue of neuroscience and education was to be discussed, specifically, at two conferences: "Learning Brain Europe" (LBE) at Manchester in June 2005 ($n$ = 71) and "Education and Brain Research" (EBR) at Cambridge University in July 2005

**Table 1**
Description of the Participants Who Took Part in the Study

| *Group* | *n* | *Description* |
|---|---|---|
| LBE conference group | 71 | Delegates at a conference in Manchester, UK, June 2005. This conference was delivered (free) as part of the INSET that teachers attend each year. This group predominantly consisted of teachers from schools in the North West of England. Speakers at this conference tended to represent the more popular aspect of the neuroscience and education world. |
| EBR conference group | 79 | Delegates at a conference to launch the Centre for Neuroscience and Education at the University of Cambridge, UK, July 2005. This group consisted of teachers and other educational professionals, such as educational psychologists, from around the United Kingdom. Speakers at this conference were academics from the domains of neuroscience, psychology, and education. |
| OECD group | 48 | Visitors to a discussion forum on the OECD Web site during the period September 2005 to June 2006. Participants represented a range of educational professions and were based in locations across the world including the United States, Europe, China, and Africa. |
| Interview participants | 11 | UK teachers recruited from local education authorities in the South West of England and from the EBR conference in Cambridge. |

*Note.* EBR = Education and Brain Research; INSET = in-service training; LBE = Learning Brain Europe; OECD = Organisation for Economic Co-operation and Development.

($n$ = 79). The first of these samples consisted of teachers arriving at an event that was compulsory training for all staff from a small group of local schools. This sample should only have received typical exposure to ideas about the brain before arriving at the conference and might be considered as most representative of the general population of UK teachers. The second sample consisted of teachers who had given up personal time to voluntarily attend an academic conference on the brain and education (part of the seminar series). To gain some sense of how the views of these teachers compared with international perspectives, we also received responses via a discussion forum for educational practitioners interested in the brain hosted on the Organisation for Economic Co-operation and Development (OECD) Web site between September 2005 and June 2006 ($n$ = 48). OECD participants were found to be based in a range of different locations across the world including the United States ($n$ = 19 participants), United Kingdom ($n$ = 8), Australia ($n$ = 3), Germany ($n$ = 3), and Netherlands ($n$ = 2). One participant from each of the following countries also took part in the study: Sweden, Spain, Mexico, Canada, China, Sudan, Ukraine, Malaysia, Greece, Poland, Singapore, Saudi Arabia, and Italy. A list of the questions included in the questionnaire is provided in the Appendix. Interview participants included teachers from the EBR conference and local teachers recruited from the South West of England. See Table 1 for summary description of participants.

## FINDINGS

Our study first asked educators if they thought that an understanding of the workings of the brain was important in their educational activities. The answer to this question was resoundingly positive. In all but one of the areas listed (curriculum content), the majority of participants rated the role of the brain as important or very important, including the design and delivery of teaching, provision for special needs, and the role of nutrition, and this rating was broadly similar, regardless of whether those being educated were children or adults. Some differences in enthusiasm were found between attendees at the two conferences, with 87% of participants at the LBE conference and a more modest 67% at the EBR conference providing an average rating of important or very important in these categories (curriculum excluded). OECD responses fell somewhere between these (80%). Participants across all groups were generally less enthusiastic about involving the brain in decisions about curriculum content, with only 57% of the respondents considering this as important or very important. Thus, a picture emerges in which educators feel that knowledge of the brain is important in making decisions about how they teach but not necessarily what they teach. In relation to the differences between the three groups, it would appear that an active pursuit of academic knowledge about the brain was associated with a more guarded attitude regarding the importance of knowledge of the workings of the brain to education. Apart from this, there were very few notable differences between the perspectives of educators recorded in the different groups, and the remaining findings are summarized in terms of the sample as a whole (except where indicated otherwise).

Having established a high degree of enthusiasm for the role of the brain in education, we wanted to explore a number of issues regarding what educators might mean by this. From discussions during the seminar series, it was clear that, while scientific research in neuroscience and psychology can provide knowledge relevant to education, many of the so-called brain-

**Table 2**
Summary of Findings From the Study

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|---|
| 1. Responses from the educators based in the United Kingdom and other locations around the world have indicated enthusiasm for a role of neuroscience in education. |
| 2. An understanding of the workings of the brain was seen as important in the design and delivery of educational programs for children and adults, provision for special needs, and the role of nutrition. It was seen as less important in decisions about curriculum content, however. |
| 3. Many educators had heard about and used a range of educational initiatives in which the brain was linked to education, including teaching and learning approaches, learning styles, educational kinesiology, ingestion and the brain, emotion and learning, and ideas based on scientific research in cognition and neuroscience. These initiatives were generally regarded as useful. |
| 4. Educational practitioners and scientific researchers differ from one another in a number of ways, including the demands of their role, their knowledge of each other's worlds, and the language that they use. Knowledge from neuroscience may require some form of translation before it is of value to education. At the same time, some brain-based initiatives might benefit from scientific investigation. |
| 5. Good communication is central to the development of collaboration between neuroscience and education, and many practitioners are keen to be active partners in the development of the field. The inclusion of neuroscience and psychology into initial teacher training and the development of a hybrid professional to act as a bridge between neuroscientists and educators are just two initiatives that could make a positive contribution to this collaboration. |

based teaching and learning tools popular in schools have not received any form of scientific validation. We asked our questionnaire participants to tell us about ideas they had heard of that linked the brain to education and how useful they thought that these were. We also asked participants to list educational initiatives that they, or others, had used in their schools and colleges and whether such initiatives had been useful.

Six categories emerged from participants' responses; in order of popularity, these were teaching and learning approaches (including reference to, e.g., mind mapping, accelerated learning, and brain-based learning), cognitive and neuropsychological knowledge (responses clearly linked with knowledge in these academic domains), learning styles (such as visual, auditory, and kinesthetic, left and right brain), educational kinesiology (including Brain Gym and other references to movement), ingestion and the brain (e.g., involving water, fish oil, and nutrition), and emotion and learning (e.g., emotional intelligence). Participants generally regarded the ideas they listed as useful. This was also true of the initiatives that had actually been used by the educators and/or their colleagues.

If something works in the classroom but lacks scientific validation, what consequences might this have for efforts to develop the interdisciplinary area of neuroscience and education? Several apparently brain-based ideas popular in education have recently become the focus of scientific criticism (e.g., Kratzig & Arbuthnott, 2006; Waterhouse, 2006). Responses from the interview participants highlight some issues here. The first issue concerns the capacity of the educator to act as a professional practitioner and to use strategies pragmatically to promote learning as they see fit, based on the skills and experience they have developed in their role. One teacher told us: "... if it works it means that we are quite happy to do it. We've been doing it for years without scientific underpinning .... What the scientific underpinning does tell you is why it's working, as opposed to we know it works." However, another teacher stressed the vulnerability of teachers to "somebody in the know telling us that works." Given the significant demands on most teachers' time, it seems vital to consider how information about teaching initiatives that claim to have a scientific basis is scrutinized and made available. One teacher spoke of how she felt when she learned that science could not support some of the ideas she had been using: "There isn't one person here who doesn't know about visual learners, auditory learners, brain gym, and it's because I guess it's something easy to understand, and I don't mean that in a patronising way. It's the sort of thing that you can grab onto and you can run with—but—we've been a bit misguided about that sort of thing haven't we—not having the time to verify it for ourselves—we have no choice."

All participants in our study were asked where they had obtained information about the role of the brain in education. Responses indicated that in-service training was the most popular source of information for teachers in this area (although teachers at the EBR conference also favored the reading of books). Somewhat less popular sources included journals (professional and academic) and the media. Responses from interview participants painted a particularly clear picture of some of the challenges involved in developing communication between scientific researchers and educational practitioners. These challenges include the following: the lack of a common language to discuss issues from neuroscience, psychology, and education; different needs (researchers need to establish scientific validity, publish in academic journals—teachers need to know what to do in their class on Monday morning); the fact that teachers may lack scientific understanding if this has not been part of their training; and researchers may lack an appreciation of the opportunities and constraints of a classroom environment. One respondent commented:

> The neuroscientists ... some of them have got a fantastic wealth of knowledge, but it's difficult for them to translate that knowledge into a hallmark that is comprehensible to the teachers ... that is relevant to the teachers. Also ... they're not gifted communicators always, whereas the snake oil sellers often are gifted communicators and they're the ones that the teachers pay to come and talk to them on their INSET [in-service training] days.

In fact, interview responses provided a strong sense that many of the teaching initiatives that did not possess a scientific basis were often presented by individuals who had given considerable thought to the needs of the educators, were able to provide teachers with something that they could use in class straightaway, and had developed their dissemination style to be memorable and appear meaningful. Knowledge from scientific research was found to be problematic because it took time to access and comprehend, often formed part of a scientific debate between different researchers, and still required some translation into practice before it could be viewed as directly relevant to the classroom setting. Relevance to the classroom, two-way communication between scientists and educators, and easily accessible information were all rated as the most important factors in the successful development of initiatives linking the brain and education.

In summary, educators who took part in our study identified a number of challenges that remain to be acknowledged and met in the course of this collaborative venture. It appears that communication will be central to the task of bringing mind, brain, and education together. The picture that emerges from this study is one in which educators are generally enthusiastic about the importance of understanding the role of the brain in educational activities. However, it is clear that those involved in bringing neuroscience and education together still have some work to do in establishing and communicating ideas and initiatives that can both become popular with teachers and meet scientific criteria for their basis. Participants in this study made a number of suggestions regarding how information could flow better between researchers and educators, including: asking researchers to spend more time in schools before beginning neuroscience research projects with educational aims, developing hybrid professionals trained in both neuroscience and education to act as translators between the two fields, and introducing psychology and neuroscience into initial teacher training. The development of this journal *Mind, Brain, and Education* that is devoted to bringing mind, brain, and education together should make a major contribution to developing such improved communication.

It is worth stressing, however, that this survey of teachers' views left us with a clear impression that educators do not want simply to be "told what works" (Goswami, 2006); instead, they wish to know more about the brain and the mind—and to receive this information in a relevant and accessible form—to augment and refine their existing knowledge and thus support their own decisions about what works in the context of their particular classroom.

The findings of this study of educators' perspectives (see Table 2 for a summary) include encouraging results regarding the levels of enthusiasm for the role of the brain in education. One challenge for those involved in bringing mind, brain, and education together is to ensure that teachers' perspectives contribute to the field as it develops, in a way that helps maintain this enthusiasm.

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## APPENDIX: QUESTIONNAIRE

1. How important is an understanding of the workings of the brain in the following:
   (a) The design of educational programmes (for children/adults)
   (b) The delivery of educational programmes (i.e. teaching) (for children/adults)
   (c) Early screening for learning problems (for children)
   (d) Decisions about curriculum content (for children/adults)
   (e) Provision for individuals with special educational needs of a cognitive nature (for children/adults)

(f) Provision for individuals with special educational needs of a physical and/or sensory nature (for children/adults)
(g) Provision for individuals with special educational needs of a behavioral and/or emotional nature (for children/adults)
(h) An understanding of the role of nutrition in educational achievement

2. Which, if any, of the following sources have provided you with information about the role of the brain in education
(a) The media
(b) In-service training (INSET)
(c) Conferences
(d) Academic journals
(e) Professional journals
(f) Books
(g) Commercial products or educational programmes
(h) Other

3. Please list any ideas that you have heard of in which the brain is linked to education. Please indicate how potentially useful you think these ideas are.
4. Has your institution used teaching/learning techniques based on ideas about the brain? If so, what form does this take? Have you or others in your institution found them to be useful? If so, how?
5. How important are the following issues in the application of neuroscience to education?
(a) A two-way dialogue between educators and neuroscientists
(b) Relevance to the "real" classroom
(c) Avoiding the misinterpretation of science
(d) Information is easily accessible to teachers and other educational practitioners
(e) Ethical issues in brain research
(f) Other