

Giving children the power to be scientists

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Children who are taught how to think and act like scientists develop a clearer understanding of the subject, a study has shown.

The research project led by The University of Nottingham and The Open University has shown that school children who took the lead in investigating science topics of interest to them gained an understanding of good scientific practice.

The study shows that this method of 'personal inquiry' could be used to help children develop the skills needed to weigh up misinformation in the media, understand the impact of science and technology on everyday life and help them to make better personal decisions on issues including diet, health and their own effect on the environment.

The three-year project involved providing pupils aged 11 to 14 at Hadden Park High School in Bilborough, Nottingham, and Oakgrove School in Milton Keynes with a new computer toolkit named nQuire, now available as a free download for teachers and schools.

Running on both desktop PCs and handheld notebook-style devices, the software is a high-tech twist on the traditional lesson plan - guiding the pupils through devising and planning scientific experiments, collecting and analysing data and discussing the results.

The pupils were given wide themes for their studies but were asked to decide on more specific

topics that were of interest to them, including heart rate and fitness, micro climates, healthy eating, sustainability and the effect of noise pollution on birds.

The flexible nature of the toolkit meant that children could become "science investigators", starting an inquiry in the classroom then collecting data in the playground, at a local nature reserve, or even at home, then sharing and analysing their findings back in class.

Professor Mike Sharples, who led the project at Nottingham, said: "Mobile devices such as smartphones and netbooks are sophisticated scientific instruments, with built-in cameras, voice recorders, and location sensors. The children quickly learned how to use the nQuire toolkit to follow investigations.

"The results from the trials we conducted showed a positive effect on learning outcomes, a maintained enjoyment of science lessons and a small but genuine improvement in pupils' understanding of the scientific process.

"Science can be a hard sell in terms of persuading young people to consider it as an option for further education or as a career, particularly those from socially-disadvantaged backgrounds. However, it shapes the world in which we live and it is incredibly important that people develop the skills necessary to navigate the huge amount of 'bad science' and misinformation which is propagated in the media. Our results show that the personal inquiry learning process can take pupils in the right direction."

Professor Eileen Scanlon, Associate Director (Research & Scholarship), who led the project at The Open University, said: "We wanted to examine whether we could effectively use technology and the process of investigation - or 'personal inquiry' - to get pupils to start thinking like [scientists](#).

"The tool this project has produced enables

teachers to construct the kind of support pupils need to really engage with a subject area. Using mobile devices gave the pupils support wherever they were, which is an important element of learning. Teaching doesn't have to be confined to the classroom and in fact, as our research shows, can be much more effective when it's allowed to extend beyond the typical learning environment. Our focus at the OU has been on support for the geography elements of the curriculum, so it has been particularly important for us to encourage pupils to investigate, and engage with, their local environment."

The trials showed that after using nQuire, the pupils were able to better grasp the principles underpinning sound scientific practice and whether decisions made during the course of their inquiries could threaten the validity of their investigations.

The project has been supported by ScienceScope, a company that develops sensing and data logging equipment, and funded with £1.2 million from the joint Economic and Social Research Council (ESRC) and the Engineering and Physical Sciences Research Council (EPSRC) Technology Enhanced Learning Research Program.

The nQuire software is now available to teachers and schools as an Open Source application, available for free download at www.nquire.org.uk and can be run on a Windows, Macintosh or Linux PC, on mobile device web browsers such as the Apple iPad or can be downloaded to a USB data stick to allow it to be run from the stick rather than installed as software on a computer.

Provided by University of Nottingham

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