Institution: University of Strathclyde

Unit of Assessment: 4

Title of case study: Adoption of behavioural roadside training programme improves children's road crossing skills.

1. Summary of the impact (indicative maximum 100 words)

In a series of training studies on children between the ages of 5 and 12 years, a research team at the Department of Psychology successfully demonstrated that substantial improvements in roadside decision-making and behaviour can be achieved in children as young as 5 years. Based on their findings, the team developed and evaluated a training intervention (Kerbcraft) aimed at improving children's pedestrian skills through practical roadside activities which was formally adopted by the UK government. Since 2008, the majority of 5-7 year old children in the UK have received formal pedestrian skills training using Kerbcraft either in its full or adapted form. Kerbcraft now plays a key role in the UK Government's road safety strategy and has been cited as an example of best practice by the World Health Organisation and safety agencies across Europe, the US, Australia and in developing countries such as Ethiopia and Bangladesh.

2. Underpinning research (indicative maximum 500 words)

Context: Road traffic accidents are one of the 10 leading causes of death and disability worldwide, resulting in a million deaths and 10 million serious injuries annually. Child pedestrians are especially vulnerable with an injury rate four times that of adults in spite of much lower exposure to traffic. In the early 1990s, Professor James Thomson assembled a research team to examine children's ability to make safe decisions about pedestrian behaviour. The team were highly critical of traditional road safety education, which cast the problem in terms of children's limited knowledge about traffic and traffic rules, with interventions typically aimed at increasing such knowledge. These interventions worked in the sense that they improved children's ability to give 'correct' verbal responses to questions posed by adults. They did not, however, give rise to measurable improvements in children's actual behaviour at the roadside. At the point at which the team entered the field, there was a widespread malaise over the limitations of road safety education and even scepticism as to whether education had anything significant to offer relative to other approaches aimed at reducing children's vulnerability, such as traffic calming. Research on road safety education had reached a major impasse [1].

Key findings:

- The Strathclyde group's distinctive contribution to this impasse was to re-conceptualize pedestrian competence in terms of skill rather than knowledge *per se*. According to this view, safe interaction with traffic requires deployment of a range of fundamental perceptuo-motor and cognitive skills [1, 2, 4, 5]. Drawing on theories of learning and development, they argued that the acquisition of such skills is best promoted through practical training in meaningful contexts (the roadside or an appropriate analogue), rather than by means of verbal learning in the classroom.
- Through a series of grants from the Department for Transport they extended their research on the 'natural' development of pedestrian skills in children by developing roadside training programmes based on their findings [1-6]. The training studies demonstrated substantial improvements in the roadside decision-making and behaviour of children as young as 5 years, making them behave like older, more experienced pedestrians. Further, they demonstrated that these improvements were robust, with little decrement in performance several months after training [3-5] and, in some cases, with continuing improvements [5]. Comparable improvements have rarely, if ever, been reported following alternative, non-behavioural training methods.
- Professor Thomson's team also explored the relationship between procedural and conceptual aspects of learning in pedestrian skill acquisition, stressing the importance of the latter in promoting generalization, transfer of learning and the avoidance of rote learning styles. Inspired by their research on interactive learning, they endorsed peer collaborative learning approaches in which children learn through joint problem solving in groups, with adults playing only a facilitatory role in the process. They also examined the types of dialogue between adults and children that promote or inhibit learning and incorporated the findings into their training methods [1,4,6].
- **Key researchers:** All the research and translational work was carried out by staff in the

Department of Psychology at the University of Strathclyde. Professor James Thomson (1978-present), Professor Hugh Foot (1990-2007), Dr Andrew Tolmie (1990-2006).

3. References to the research (indicative maximum of six references)

1. Thomson, J.A., Tolmie, A.K., Foot, H.C. & McLaren, B. (1996) Child Development and the Aims of Road Safety Education. Road Safety Research Report No. 1. London: H.M.S.O.
2. Thomson, J.A. (1997) Developing safe route planning strategies in young child pedestrians. Journal of Applied Developmental Psychology, 18, 271-281.
3. Thomson, J.A., Ampofo-Boateng, K., Lee, D.N., Grieve, R., Pitcairn, T. & Demetre, J.D. (1998). The effectiveness of parents in promoting the development of road crossing skills in young children. British Journal of Educational Psychology, 68(4), 475-491.
4. Thomson, J.A., Tolmie, A.K., Foot, H.C., Sarvary, P.A., Whelan, K.M. and Morrison, S. (2005). Influence of virtual reality training on the roadside crossing judgements of child pedestrians. Journal of Experimental Psychology: Applied, 11(3), 175-186.
5. Foot, H.C., Thomson, J.A., Tolmie, A.K., Whelan, K.M., Morrison, S. and Sarvary, P. (2006). Children's understanding of drivers' intentions. British Journal of Developmental Psychology, 24, 681-700.
6. Tolmie, A.K., Thomson, J.A., Foot, H.C., Whelan, K.M., McLaren, B. & Morrison, S. (2005). The effects of adult guidance and peer discussion on the development of children's representations. British Journal of Psychology, 96, 181-204.

Notes on quality: Reference 1 is a peer-reviewed government report commissioned to make recommendations on the research required as a precursor to the development of effective pedestrian training resources for children. On the basis of its recommendations the government established the Child Development Research Programme with dedicated funding to undertake the recommended research, funding numerous projects over the subsequent 15 years. The other references are peer-reviewed empirical papers published in leading journals. The research has been supported by the following grants:

- Thomson, J.A. (1993-1995) Department for Transport, Strathclyde Regional Council: to develop and evaluate a pedestrian skills training programme for young children, £175,406.
- Thomson, J.A., Tolmie, A.K., Foot, H.C. (1995-1997) Department for Transport: a study of visual search and attention in the context of pedestrian behaviour, £111,436.
- Thomson, J.A., Tolmie, A.K., Foot, H.C. ESRC: adult guidance versus peer collaboration in the training of pedestrian skills in young children, £40,000.
- Tolmie, A.K., Thomson, J.A, Foot, H.C. (1998-2000) Department for Transport: development and evaluation of a virtual reality pedestrian training programme for children aged 5-10 years, £181,842.
- Tolmie, A.K., Thomson, J.A., Foot, H.C. (2000-2002) Department for Transport: development and evaluation of a virtual reality resource for training children in the safe use of designated pedestrian crossings, £331,507.
- Thomson, J.A., Tolmie, H.C., Foot, H.C., and O'Connor, R.K. (2002-2005) Department for Transport: an investigation of the role of skills, attitudes, and perceived behavioural control in the pedestrian decision-making of adolescents aged 11-15 years, £271,492.

4. Details of the impact (indicative maximum 750 words)

Process from research to impact: The research described in Section 2 led the group to develop the *Kerbcraft* resource which is designed to teach 5-7 year old children three skills: recognising safe versus dangerous roadside locations; crossing safely between parked cars; and crossing safely near junctions. They later developed *Crossroads,* a virtual reality resource aimed at developing more advanced skills in 8-12 year olds (visual search, visual timing skills, reading drivers' intentions, and using designated crossings). Kerbcraft was formally launched by the government in 2001 as the National Child Pedestrian Training Scheme across the UK with £9 million of dedicated funding and ran until 2008 when local authorities were expected to mainline the scheme. The National Scheme was itself independently evaluated by the Department for Transport who subsequently funded production of a revised manual, additional support materials and training video which were launched in 2008. Crossroads was adopted as a national resource

aimed at older children who had already completed Kerbcraft in 2005.

Description of impact: This case study is based on the impact of the revised training scheme launched in 2008. The Strathclyde group's work has stimulated benefits in two ways: firstly through nationwide implementation of the Kerbcraft training scheme across the UK; and secondly by informing professional practice and government policy in a number of countries across the world on the critical role of practical roadside training and interactive learning methods in child pedestrian education.

Adoption of Kerbcraft in UK road safety education: In 2008, there were 138 Kerbcraft schemes running across 98 local education authorities in England, Scotland and Wales. In total, 1,418 schools ran Kerbcraft and 95,353 children were trained (Source A). Since then the use of Kerbcraft in its original or modified form has continued to be used across the UK. For example, a report to the Welsh Government showed that, in 2009, 23 Kerbcraft schemes were running across 377 schools in Wales and 10,635 children were trained in that year alone by 1076 volunteers and the Welsh Government's 2012 draft Road Safety Delivery Plan concludes "Now in its fifth year, MVA Consultancy's review of Kerbcraft shows a continuing expansion of the scheme throughout Wales. The scheme now involves more children and more schools than in any previous year" (Source B). In 2011, an independent evaluation of child pedestrian training throughout the UK was carried out by the University of Southampton (Source C).They surveyed 101 local education authorities and found that 80% were offering the Kerbcraft programme either in its original or modified form.

Adoption of Kerbcraft in developing countries: Beyond the developed world, Kerbcraft is currently being piloted in Bangladesh, which suffers one of the world's highest rates of road traffic injuries. The Bangladesh Centre for Injury Prevention and Research has translated the Kerbcraft resources into Bengali and produced a training video adapted to local needs. If the pilot scheme is successful, the aim is to introduce the programme nationwide (Source D). In 2010, the Kerbcraft scheme was also introduced in Ethiopia with 992 children receiving training that year (Source E).

Kerbcraft forms part of UK government's policy and child road safety strategy: At the level of policy, the UK Department for Transport's 2011 Strategic Framework for Road Safety states that "the Kerbcraft scheme remains the basis for children's practical road safety training. It is a roadside pedestrian training scheme which has been proven to deliver a lasting improvement in road crossing skills. We encourage Local Authorities to adopt Kerbcraft or similar child pedestrian training schemes, rather than anything that is watered down or less effective and target it on high risk areas and groups" (Source F p.50). The recent House of Commons Transport Committee Report (*Ending the Scandal of Complacency: Road Safety beyond 2010*) welcomed the use and support of Kerbcraft (p. 25) and noted that "while both Kerbcraft and Bikeability aim to improve children's road user skills, they may have benefits in later life if they go on to learn to drive" (p.9). In a report on health strategy to the Department of Health, the Health Protection Agency also recommends "UK-wide implementation of successful interventions to include practical road safety programmes, such as Kerbcraft" (Source G p23). Similarly, a report to the Northern Ireland Department of the Environment (2011) on child road safety recommends that the NI government should "Enhance practical child pedestrian safety training in line with the 'Kerbcraft' scheme as operated in England, Scotland and Wales and to include parents in its delivery..... The Department for Transport's evaluation of this scheme found far reaching benefits within the community" (Source H p.30). The NI Road Safety Strategy to 2020 endorses this, saying "we will continue to provide the…. Practical Child Pedestrian Scheme and other current initiatives and support those schools wishing to participate" (p60). Finally, the Welsh Government's draft Road Safety Delivery Plan (2012) reiterates its continuing support of Kerbcraft as part of its road safety strategy and commits itself to funding Kerbcraft as part of its strategy to 2020.

Influence on international road safety education: In the USA, the Child Pedestrian Safety Curriculum issued by the National Highway Traffic Safety Administration in 2011 (Source I) refers extensively to the Strathclyde group's research. The guidelines state that "Teachers should seek to engage students in teacher discussion and modeling by asking questions and prompting dialogue. Thus, children will incorporate these basic principles into their own behaviors". "Teachers should

also allow children to use social interactions with their peers to further promote positive behavior. The option of using older students as models for younger children is one such way to show significant increases in safe behaviors. Using older children as models and incorporating student-peer-adult discussion on a consistent basis are encouraged throughout the program" (p.2). They quote numerous papers by the Strathclyde group in support of these recommendations. In Australia, the Department of Education in Western Australia commissioned a study on the evidence base for road safety practice and issued 16 Principles for School Road Safety Education. Six of the principles are based on the Strathclyde group's work and these now form part of the Road Safety Education Plan for Western Australian Schools and Communities 2011-13 (Source J).

Influence on thinking of international agencies: Thomson et al.'s work has also been cited by key world and European agencies. The World Health Organisation/Unicef World Report on Child Injury Prevention (Source K) states "Current research on road safety education suggests that an approach that stresses behaviour, focusing on the development of practical skills, is more likely to be effective for younger children. Children learn best through methods that develop problem-solving and decision-making skills". It then cites Kerbcraft as an effective educational intervention that achieves these aims (p 48). Kerbcraft also features as a case study in the European Child Safety Alliance's Child Safety Good Practice Guide (Source L). This document states that the roadside training undertaken in Kerbcraft "is an essential ingredient of pedestrian skills training".

Since 2008, the majority of 5-7 year old children in the UK have received formal pedestrian skills training using Kerbcraft either in its full or adapted form and the evidence is that this will continue. The work of the Strathclyde team has impacted on society by changing government policy within and beyond the UK, changing professional practice, and giving hundreds of thousands of children training that demonstrably improves their roadside decision making and behaviour.

5. Sources to corroborate the impact (indicative maximum of 10 references)

A. Evaluation of the National Network of Child Pedestrian Training Pilot Projects: Department for Transport, Road Safety Research Report No. 82, 2008. http://assets.dft.gov.uk/publications/national-network-of-child-pedestrian-training/82-main-report.pdf
B. Welsh Government (2012). Draft road safety delivery plan http://wales.gov.uk/consultations/transport/draftroadsafetydelplan/?lang=en
C. Hammond, J. Cherrett, T, Waterson, B. (2011) An evaluation of child pedestrian training in the UK. http://www.utsg.net/web/index.php?page=2011---milton-keynes
D. Centre for Injury Prevention and Research, Bangladesh http://www.ciprb.org/~ciprb/index.php/units/centre-for-injury-prevention-and-research/burn-prevention-and-research-centre/2-site-content/13-rod-rtirc
E. Where there's no green man: child road-safety education in Ethiopia http://www.tandfonline.com/doi/abs/10.1080/09614524.2010.491531#.UlVwOFMphZg
F. Department for Transport Strategic Framework for Road Safety Policy http://www.dft.gov.uk/publications/strategic-framework-for-road-safety
G. A children's environment and health strategy for the UK: Health Protection Agency, 2009. http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1237889522947
H. Northern Ireland Child Road Safety and Poverty Research Project http://www.doeni.gov.uk/roadsafety/final_report__no_appendices_final.pdf
I. US National Highway Traffic Safety Administration Child Pedestrian Safety Curriculum http://www.nhtsa.gov/ChildPedestrianSafetyCurriculum
J. Road Safety Education Plan for Western Australian Schools and Communities 2011-13 http://www.det.wa.edu.au/sdera/detcms/navigation/road-safety/
K. WHO, Unicef: World Report on Child Injury Prevention, 2008 http://whqlibdoc.who.int/publications/2008/9789241563574_eng.pdf
L. European Child Safety Alliance: Child Safety Good Practice Guide http://www.childsafetyeurope.org/publications/goodpracticeguide/