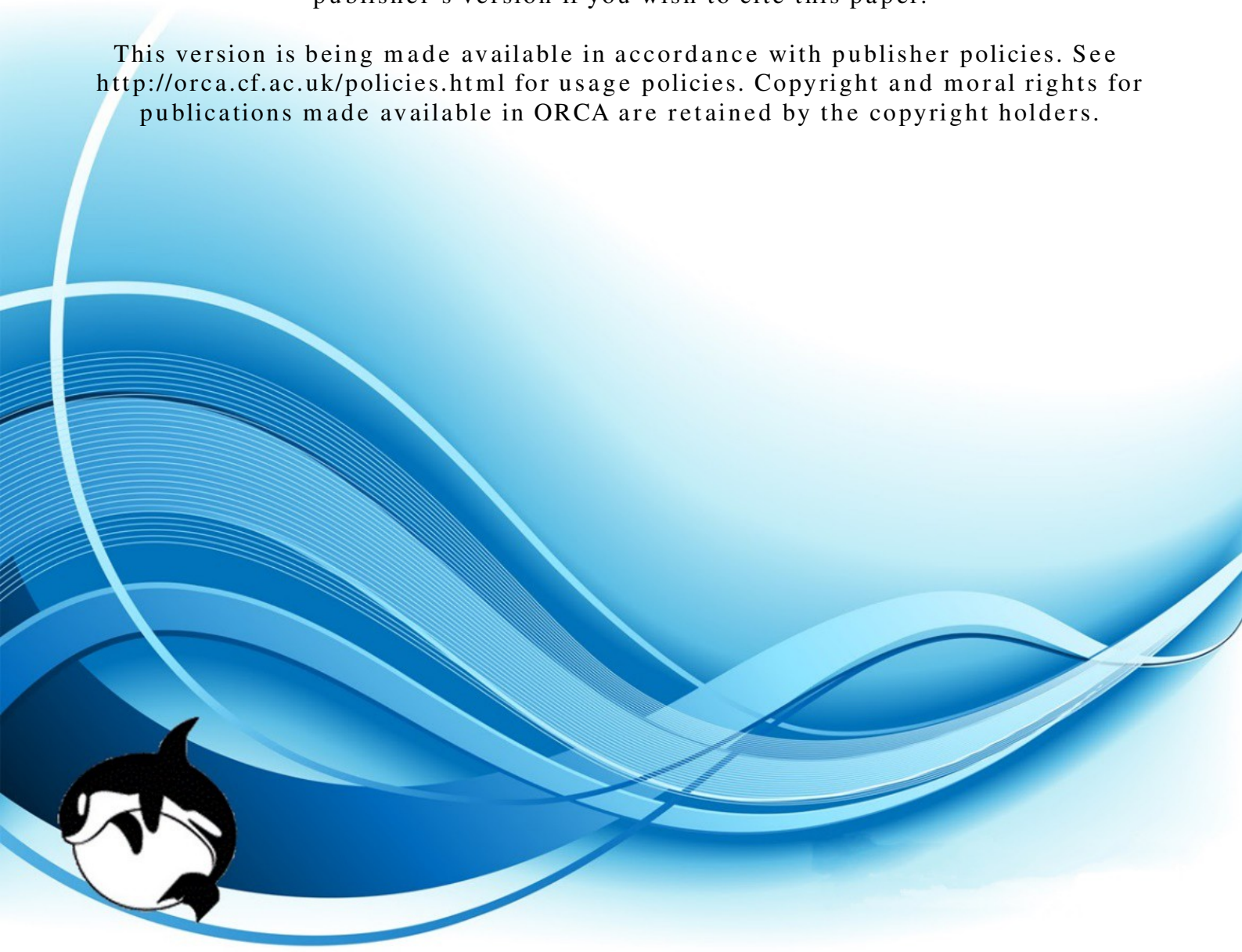

Title
Bridging the divide: the potential role of contemporary geographical research in schools

Running head
Bridging the divide

Authors
Peter K. Mackie*
Senior Lecturer, School of Geography and Planning, Cardiff University, Cardiff, UK
Glamorgan Building, King Edward VII Avenue, Cardiff, CF10 3WA
02920 876223, MackieP@Cardiff.ac.uk
**Corresponding author*

Aleksandra Kazmierczak
Lecturer, School of Geography and Planning, Cardiff University, Cardiff, UK
Glamorgan Building, King Edward VII Avenue, Cardiff, CF10 3WA
02920 875281, KazmierczakA@cardiff.ac.uk

Abstract
This paper examines the implementation and impacts of a program intended to improve research-led teaching in schools. Little consideration is given to the role of research-led teaching in schools and we argue this is a consequence of fractures between schools and universities. A program was developed to bring contemporary geographical research of university scholars into schools. Examining this program, we find being exposed to research: improves access to up-to-date knowledge; heightens student enthusiasm; and informs choices students make about their learning. This paper calls for bridges to be built between universities and schools upon the nexus of teaching and research.

Key words
Research-teaching nexus, research-led teaching, geography, school engagement, outreach

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INTRODUCTION

Research-led teaching plays a key role in the teaching of human geography at university, with scholars identifying benefits to students which include: access to up-to-date knowledge (Barnett 2000; Healey and Jenkins 2006), improved student enthusiasm and engagement (Deakin 2006; Jenkins *et al.* 2008), informed choices about future learning (Lindsay *et al.* 2002), and heightened credibility of student education (Lindsay *et al.* 2002). Despite these apparent benefits at university-level, almost no consideration has been given to the potential role and impacts of research-led teaching within secondary/high schools. We argue that this omission largely results from the fractures that persist between schools and universities – fractures which are particularly notable in the United Kingdom (UK) context (Castree *et al.* 2007) but also exist elsewhere (Jo and Milson 2013). In response, academics at Cardiff University in the UK developed a program which brings the contemporary geographical research of university scholars into school classrooms through a web-based depository of research case studies and an annual event where case studies are presented to teachers. The program aimed to enhance research-led teaching in schools and bridge the divide between university and schools. This paper presents the results of a small-scale study examining the implementation and impacts of the program.

THE RESEARCH-TEACHING NEXUS

The research-teaching nexus has been the focus of a considerable volume of pedagogic literature (Brown 1999; Colbeck 1998; Gibbs 2002; Brew 2006, 2010; Deakin 2006; Jenkins *et al*. 2007); a claim evidenced by the fact over 1,900 articles are returned in SCOPUS (one of the largest abstract and citation databases of peer-reviewed literature) when searching for 'research-teaching' as a key word or within the title of an article. Such academic scrutiny is at least partly driven by a desire to critique the wholehearted adoption of the research-led teaching

mantra by research intensive universities, where there is an assumption that combining the two will benefit teaching and learning. The aim of this subsection is to synthesize key literature on the research-teaching nexus within the discipline of geography. We begin by presenting Healey's (2005) conceptualization of the research-teaching nexus, however the focus of our discussion is on the main impacts on students of combining research and teaching.

Healey's (2005) adaptation of Griffiths' (2004) framework is repeatedly cited (Healey and Jenkins 2006; Jenkins *et al.* 2007) and provides an excellent basis for understanding the different ways in which research and teaching might be combined. First, a *research-led* approach entails students learning about research findings. Second, in a *research-oriented* system the focus of student learning is on the processes of doing research. Third, *research-based* teaching requires students to learn through inquiry (see also Deakin 2006 and Speake 2015). Healey's (2005) fourth approach is *research-tutored*, whereby students write essays and discuss ideas with tutors who are research active in the essay topic. Table 1 summarizes these different approaches and provides examples of teaching activities under each. Healey and Jenkins (2006) argue that teaching should focus on the two student-centered approaches (research-based and research tutored), however scholars acknowledge that the role of research differs significantly across disciplines (Brew 1999, 2006; Ishiyama 2002; Jenkins *et al.* 2007; Schapper and Mayson 2010).

Table 1. Example teaching activities under Healey's (2005) four approaches to combining teaching and research

Approach	Description	Example teaching activity
Research-led	Learning about research findings	Lecturers present classes with the empirical findings of their recent research.
Research-oriented	Learning about processes of doing research	Students are instructed in a classroom about the strengths and weaknesses of different research methods.
Research-based	Learning through inquiry	The research dissertation.
Research tutored	A discussion of ideas between a research active lecturer and a student, based upon written work produced by the student.	An individual tutorial, where a student meets with their lecturer to collaboratively discuss a written piece of work.

Healey and Jenkins (2006) argue that the latest research findings are more likely to be taught to students (the research-led approach) in social science disciplines[1]such as human geography, than physical or biological sciences, because the knowledge can be understood by students at earlier stages in their education. The hierarchical nature of knowledge in the physical and biological sciences prohibits students from grasping more advanced, contemporary knowledge until they have first understood the key building blocks. Students in the physical and biological sciences are engaged in contemporary research, but they are more likely to engage through a research-based approach, where lab-sessions constitute a part of their teacher's research (see also Ishayama 2002).

Given the role of research-led teaching in human geography at universities, and its use in the case studies program being reviewed, we focus on this particular approach in our examination of the impacts on student learning[2]. A review of selected literature identifies four primary impacts of adopting a research-led approach to teaching in universities. *Up-to-date*

knowledge is the first and most widely cited impact (Barnett 2000; Lindsay *et al*. 2002; Healey and Jenkins 2006; Jenkins *et al.*, 2008). Research active teaching staff are able to draw upon their most recent studies and their engagement with policy and practice developments, ensuring students are abreast of contemporary debates. Second, *student enthusiasm and engagement* is improved (Lindsay *et al.* 2002; Deakin 2006; Jenkins *et al.* 2008). For example, Jenkins *et al.* (2008) and Hill and Jones (2010) describe how students sense the enthusiasm of their lecturers when referring to their own work and this consequently improves student motivation and engagement. Deakin's (2006) findings are less supportive of this claim, suggesting the impacts on student satisfaction are only marginal. Third, the research activities of academic staff reportedly impact on the *choices students make about their learning*. For example, Lindsay *et al.* (2002) documented how students chose dissertation topics on the basis of academic staff interests. Fourth, according to Lindsay *et al.* (2002) students believe studying in a research-led institution leads to *heightened credibility of their education* when they seek employment. Students believed that when applying for work they would benefit from having studied at a university which is at the cutting edge of the subject.

While there appear to be positive impacts of research-led teaching in universities, scholars have also pointed to detrimental consequences. According to Jenkins *et al.* (2008) a key weakness is that research-active teaching staff are often unavailable to meet and support students, largely because they are preoccupied with their research commitments. However, Hattie and Marsh (1996) dispute this claim in their comprehensive meta-analysis which explores the relationship between research and teaching quality. A second critique relates to course design, where scholars suggest the curriculum can sometimes be too heavily influenced by staff research interests, failing to engage with wider material relevant to the discipline (Neumann 1994).

There is sufficient evidence to suggest research has a key role to play in university teaching and in the context of geography teaching this often takes the form of research-led teaching, where students learn about the findings of recent research. While the research-teaching nexus has dominated pedagogical debates in universities, much less attention has been given to the potential role of research-led teaching in schools. In the next section of this paper we suggest this is largely due to the divide that exists between schools and universities.

RESEARCH-LED TEACHING AND THE UNIVERSITY-SCHOOL DIVIDE

While research plays a key role in pedagogic developments within schools, to date there has been limited consideration of the potential impacts of research-led teaching in the school geography classroom (Godfrey 2016 provides an exception), which is surprising given the prominence of this approach to teaching at university level and the recognized benefits to students. It is important to recognize that there are key differences between the institutional contexts of universities and schools. Universities combine research and teaching functions and have great flexibility in teaching design, whereas the primary function of schools is to teach and there is limited flexibility in the design of courses. Consequently, there is much greater scope and indeed a need for research to inform university-level teaching. However, the proven benefits of research-led teaching in universities surely prompt us to consider the potential benefits of heightened engagement with this approach in schools.

We argue the primary reason for the absence of a research-led approach to teaching in schools is the 'chasm' (Goudie 1993, p. 338) that exists between the school geography classroom and the university geography lecture theatre (Goudie 1993; Machon and Ranger 1996; Shaw and Matthews 1998; Lees 1999; Brown and Smith 2000; Lynch 2002; Bonnett 2003; Lowe and Cook 2003; Castree *et al.* 2007; Ramsden 2008; Hill and Jones 2010). In this section of the paper we briefly explore the two types of divide that appear to have emerged

between universities and schools: a physical divide and a knowledge divide. As Bonnett (2003, 55) states:

'University and non-university geography appear to inhabit different worlds.'

University lecturers have tended to physically engage with schools through four main mechanisms: delivering lectures and talks to students in their schools (Lynch 2002); delivering lectures to teachers at conferences and seminars promoted by discipline-specific organizations (e.g. in the UK context - the Geographical Association) (Stannard 2003; Yarwood and Davison 2007); hosting students and teachers at university-organized events (Houser *et al*. 2015); and involving students in research projects and internships (Riggs *et al*. 2007). Engagement persists across all four formats, largely driven by aims to improve recruitment, particularly in the North American context where recruitment to bachelor programs is currently problematic (Miller *et al.* 2007; Gonzales *et al.* 2010; Houser *et al*. 2015; Leydon *et al*. 2016). However, there is a consensus amongst scholars that levels of contact have reduced over the past two decades (Goudie 1993; Lynch 2002; Stannard 2003; Castree *et al.* 2007; Yarwood and Davison 2007; Hill and Jones 2010). For example, Yarwood and Davison (2007) identified declined levels of lecturer engagement with the Geographical Association in the UK. They explain that evening lectures are the *'mainstay of Geographical Association branches'* and are normally delivered free of charge by academics to students and teachers (Yarwood and Davison 2007, 544) and yet there have been difficulties in securing academic speakers and some planned sessions have been cancelled due to poor attendance by teachers. What has caused this growing chasm between schools and universities?

Lynch (2002) suggests that academics have tended to withdraw from delivering guest lectures in UK schools at least in part due to the assessment of research excellence in UK

universities, which does little to encourage engagement with schools and instead drives academics to focus on peer-reviewed publications for the academy. Of course, the impact agenda of the more recent Research Excellence Framework in the UK encouraged scholars to consider their impacts on society and to look outward but few impact case studies submitted by university geography departments focused on engagement with schools. While university lecturers are being pulled toward other priorities, according to Castree *et al.* (2007) and Hill and Jones (2010) a similar force is being felt by teachers, who find themselves restricted to continuing professional development courses which focus narrowly on examining board requirements and expectations, rather than exploring emerging subject material that universities are more likely to deliver.

The knowledge divide between school-level geography and university-level geography has followed a similar trajectory to the physical divide: the gap has generally worsened over recent decades. Stannard (2003, 318) describes a *'prevailing (and largely accurate) perception of a contrast between a vibrant, trendy subject at university, and a static, stuffy subject in schools.'* He, and others, talk of a divide in pedagogy and subject matter (Marriott 2001; Rawling 2001; Stannard 2003; Castree *et al.* 2007), which is perhaps best evidenced by the almost complete absence of cultural geography in schools, a sub-discipline that has played an important part in research and teaching in universities since the 1990s. In the USA context, Jo and Milson (2013, 200) conclude that high school students are not sufficiently prepared for university-level Geography. They identify an 'expectations gap' whereby university professors and high school teachers have different perspectives on what ought to be covered at high school in the Advanced Placement Human Geography.

Of course the lack of physical contact between universities and schools contributes to the knowledge divide but Unwin (1996) and Castree *et al.* (2007) also suggest that academics have failed to engage with those who design school curricula. One inevitable consequence is a

growing gap between knowledge generated and taught at universities and the material taught in schools. However, the most recent developments of the UK school geography syllabi in 2015 were informed by panels of academic advisors, hence syllabi are emerging which begin to close the knowledge gap. Textbooks provide one source of ongoing intellectual interaction between a small number of academics and schools but given the necessary alignment between these and school syllabi, they hardly challenge the status quo and very quickly become outdated (Hopkin 2001; Lee and Catling 2016).

BRIDGING THE DIVIDE: INTRODUCING THE GEOGRAPHICAL CASE STUDIES PROGRAM

In 2011/12 Cardiff University, under the leadership of the lead author, developed and introduced a research case studies program which brings the contemporary geographical research of the university's scholars into secondary/high school classrooms. The initiative was developed with two broad objectives. First, it sought to enhance research-led teaching in schools by providing teachers with up-to-date examples of geographical research. Based on experiences of research-led teaching in universities we hypothesized that the program might lead to up-to-date knowledge in the classroom, heightened enthusiasm and engagement among students, impacts on student choices about their learning, and potentially impact on the perceived credibility of their education. The second objective of the program was to improve links and bridge the divide between the university and schools.

The foundation of the initiative is a collection of 2-3 page geography research case studies[3] produced by approximately 30 academics whose research is geography-related. It is important to recognize that not all case studies were produced by scholars who would identify as geographers as they were drawn from two separate departments: one with a focus on urban planning and human geography and the other with specializations in earth and ocean sciences

and physical geography. An initial review of school syllabi was undertaken to identify broad and often recurring themes and lecturers were asked to draw upon their research (published and unpublished) within these themes to develop case studies. Table 2 identifies the broad themes of the case studies and includes examples of case study titles. Case studies were edited for consistency and to ensure appropriate language for a school-age audience. Case studies are uniformly structured, including an introduction to the research problem, an overview of the research methods employed, the findings, recommendations and conclusions. All case studies also direct students and teachers to a website where further information can be found on the topic. The case studies are delivered through two primary means. First, a website was produced which holds information on the program and the free-to-download case studies. The website was promoted initially through a direct mail to heads of geography at UK schools which frequently send students to the university. The second mode of delivery is an annual event where teachers are invited to attend a day of presentations by authors of the case studies. The research case studies program launched in early 2012 and had been ongoing for four full years (2012-2015) at the point when this study was undertaken.

Table 2. Geography case study themes and example titles

Theme	Example case study titles
Cultural geography	Studentification The sport of surfing
International Development	Child labour Informal economies in the developing world
Economic development	Design and regeneration in Liverpool city centre Economic crisis: the economic resilience of regions
Social inclusion	Migration and neighborhoods Open-case mining in the South Wales Valleys
Sustainability and the environment	The environmental impacts of major sporting events Sustainable food supply systems
Climate change	The effects of climate change and ocean acidification Planning for coastal climate change around the Severn Estuary
Coastal management	Coastal management on the island of Jersey Adding up the change: capturing the cumulative effects of dynamic shorelines

METHOD

We used a mixed-method approach to investigate the implementation and impacts of the program. The research employed three methods: an analysis of website usage data; an online survey of school teachers; and two focus groups with school teachers. Informal feedback emails sent by participants of the university research case study event were also used to supplement the primary research methods.

The research case studies program website (hosted by the university) has been live since May 2012. Using a website analytics program we were able to determine the number of unique

views of the website on an annual basis. These data provide a strong indication of the level of interest in the research case studies program.

The online survey was distributed to a sample of 89 teachers in schools in the UK, who had either attended the research case studies program between 2012 and 2015 or had expressed an interest in doing so. The survey could not be distributed more widely as our interest lay in experiences of those who had engaged in the case studies program. The survey was distributed in July 2015 and consisted of ten questions which broadly explored: the extent and frequency of case study use/planned use; the subjects in which the case studies were used/planned to be used; the age groups the case studies were used/planned to be used with; the ways in which the case studies had been used/planned to be used; the perceived usefulness of the case studies; and potential improvements to the case studies initiative. The survey generated a relatively low response rate of 28% (25 responses), which is likely to be associated with the current limited levels of research-related exchange between universities and schools (Stannard 2003; Godfrey 2016). We recognize the limitations associated with the small sample size, such as the inability to apply statistical analysis, however these are to an extent off-set by the qualitative elements of the study.

The sample of 89 teachers was also invited to attend a focus group at the university in two consecutive years. The same five teachers attended a focus group in both 2015 and 2016. Focus groups were facilitated by the authors and explored the same questions/themes as the online survey but sought qualitative responses. Moreover, repeating the focus group in 2016 provided an opportunity to feedback results from 2015, to clarify any uncertainties and to probe further on specific findings. Focus groups discussions lasted approximately 1.5 hours and were recorded and transcribed. The focus group transcripts were thematically analyzed along with the feedback emails and open-ended comments provided by the respondents in the online survey.

USING GEOGRAPHICAL RESEARCH IN SCHOOLS

The extent of research case study use

Between 2012 and 2015, the website containing the research case studies received 6,294 views. The total number of views has consistently remained at approximately 2,000 views per year since 2013, albeit we recognize that not all views will be from teachers. These data indicate that the reach of the case studies program is considerable and that the demand by teachers for examples of contemporary research, which Yarwood and Davison (2007) identified a decade ago, persists today. The online survey of teachers reinforces the message that there is a demand for research in schools, with eight of the questionnaire respondents having used the case studies in teaching, while 16 teachers had not but were intending to use them in the future. Only one respondent had not used the case studies and did not plan to use them.

When asked how frequently teachers used the case studies (either current or anticipated), the majority (15 respondents) used them occasionally, while a significant minority (5 respondents) used them frequently, and only two respondents rarely used them. For the two respondents who selected 'Other', the frequency was dependent upon the units being taught and the time of year: *'Maybe nothing for months and then lots for a few weeks.'* This finding confirms that research is not a frequent component of school-level teaching (Godfrey 2016) but it is also likely to reflect the lack of a comprehensive range of curriculum-related research resources. In 2015 the research case studies program consisted of only 34 research case studies, which would inevitably leave significant areas of the curriculum untouched.

Which students use the research case studies?

The geographical research case studies were designed to be used with students aged 16-18 in UK schools and yet informal discussions with teachers during the case study event suggested the resources were being used beyond the initial target audience. Teachers were presented with a multiple response question, asking them to identify the ages of the students with whom the case studies were used or anticipated to be used. They were mainly used or anticipated to be used with students aged 16-18 (21 respondents), followed by ages 14-16 (10 respondents) and ages 11-14 (5 respondents)[4]. Several focus group participants emphasized that the case studies are written in a style that does not preclude the younger students from understanding the contents: *'we have used [the case studies] with all abilities across all year groups...they are brilliant!'*. One teacher explained that while the material can be challenging, it is the role of the teacher to make the material accessible to students; *'it is how you use them as a teacher.'* However, a contrasting message emerged from some survey respondents, with six teachers stating that a stronger alignment is needed between the research case studies and the geography syllabi in schools:

> *'Make them [the case studies] specification-related, especially with the new specifications in 2016.'*
>
> *'The case studies are not tailored to what has to be delivered and for our center are pitched too high.'*

If the case studies were directly aligned with school syllabi they would almost certainly be used more widely but there are two key obstacles that prevent this development. First, the case studies would become similar to textbooks, failing to challenge the status quo within schools (Hopkin 2001; Lee and Catling 2016) and failing to expose school students to some of the very

different material being researched and taught in universities. Indeed, one teacher stated; *'the fact that they give an insight into research is great - don't try and link them to any exam syllabus'*. Second, scholars in universities do not necessarily have research data that would enable them to prepare case studies which align directly with the syllabi. These contrasting answers emphasize potential problems associated with presenting original geographical research carried out by university staff to school students and perhaps most significantly it reinforces the findings of previous research about the gap between research in universities and the material taught in schools (Bonnett 2003; Stannard 2003).

HOW CASE STUDIES ARE USED

'Gosh the list is endless - debates, mystery, case studies and much more!'

Before we introduce the specific uses of the case studies it is important to recognize that teachers adopted both teacher-led and student-led approaches, demonstrating that the role of research in schools extends beyond research-led teaching, to research-based learning in which students learn through inquiry (Healey 2005; Deakin 2006; Speake 2015). According to one teacher (feedback email): *'Some of these tasks were teacher-directed, e.g. create a presentation from the case study material. Alternatively, the students were able to access these materials for their own research purposes e.g. essay writing tasks'*. The online survey and focus groups revealed that case studies were predominantly used to illustrate specific issues and encourage debate. Another common use of the case studies was to teach research processes and research methods alongside more general study skills. Finally, research case studies are being used by teachers to guide student choices about future study. Each of these methods of integrating research case studies into teaching are elaborated below.

Nine of the survey respondents have used/would use the case studies to illustrate specific issues in a lesson. For example, one survey respondent used case studies as *'reading material at the start of lessons and as further reading at the end of a topic.'* Importantly, some of the case studies were used to provide an alternative perspective and a critique of mainstream ideas, therefore encouraging debates among students. For example, two respondents said that they used the case studies specifically to start discussions and *'to encourage expansion of thought/getting pupils to think out of the box'*; and *'to challenge some misconceptions'*. One teacher in an email sent after the research case studies event wrote that *'a set of interesting lessons focused on the work of street children which created lots of discussion.'* In this instance research-led teaching clearly encourages critical thinking among students.

Seven survey respondents listed learning of research methods (in particular visual methods such as videos) among the uses of the case studies, or as the only use. The research methods discussed in the case studies, according to the respondents, help to inform students who are selecting methods for their own individual research investigations. For example, one focus group participant reported a student using the material to support a project on the use of green spaces by people. More generally, the case studies were seen by one focus group participant as a way of giving students *'an idea about research'*: how it is done and what they may expect if they go to university and have to complete a research dissertation. In fact, one online survey respondent called for more discussion of research methods within the case studies.

Case studies were also seen as excellent material to support general study skills. First, by checking the understanding of the text, teachers were assessing students' literacy skills, a task which, according to one focus group participant, teachers are *'bombarded with'*. It was also important that the case studies gave an insight into referencing techniques, as the issue of attributing sources of information was seen by the teachers as a common problem.

Finally, the case studies were used by teachers to present geography as an exciting subject worth studying at higher levels. According to one focus group participant, at age 15-16 the case studies were used to help students make decisions about studying geography in post-16 education: *'they ask me, "why should I do geography", and I go "there you go".'* At this point the teacher gestured how she put a printed booklet of research case studies in front of the students. During post-16 education the case study material was then reportedly used by some teachers to illustrate that *'geography is not just rivers and coasts'* and to encourage students to consider studying geography at university. In this final example parallels can be drawn with the work of Lindsay *et al.* (2002) in which the research presented to university students influenced their choices about future study (e.g. choice of dissertation topic).

THE IMPACTS OF RESEARCH-LED TEACHING IN SCHOOLS

Significantly, the majority of the respondents to the online survey saw the case studies as either very useful (8 respondents) or useful (14 respondents), with only one respondent claiming that the case studies were not at all useful. In the next paragraphs we unpack why the case studies were perceived to be useful. We found that impacts were similar to those of research-led teaching in universities and related to: up-to-date knowledge, enthusiasm and engagement, and student decisions about their education.

One of the impacts of the research case studies program most frequently identified by teachers was having access to up-to-date knowledge either through the online depository or thorough attendance at the event. This finding echoes experiences in universities where the most widely cited impact of research-led teaching is access to contemporary knowledge (Lindsay *et al.* 2002; Healey and Jenkins 2006; Jenkins *et al.* 2008). Focus group participants emphasized that it gave them an opportunity to learn something new that is outside the syllabus, which they can *'pass on to students and colleagues'*. One of the teachers commented: *'I learnt*

lots and have already started feeding back and planning' and another one observed: *'you can see people on the day absorbing the information'*.

Five of the online survey respondents claimed that their use of the geographical research case studies has considerably impacted upon student enthusiasm and engagement. The research case studies were observed by a focus group participant to get students engaged, giving the classes *'more momentum'*. One of the survey respondents wrote that the case studies substantially increased student interest: *'questions and more questions - it has made them think far more than before!'* Based on previous research with university students (Deakin 2006; Jenkins *et al.* 2008) we had hypothesized that there would be an impact on student enthusiasm but we had not anticipated the same impacts on teachers and yet we found considerable impacts on teacher enthusiasm and motivation following the case study event. The event was perceived to provide a welcome break from the everyday teaching duties and reinvigorate the teachers' interest in their subject: '*I can't begin to describe how much more revived you feel about geography after the session'*; *'You could say you leave feeling energized especially at a very tiring point in the year due to exams being completed and so on.'* One of the attendees commented on his *'renewed enthusiasm for geography'* in the feedback email: '*it reminded me of my own passion for learning and academia. This has made me contemplate doing an MA.'* Thus, engagement with research seems to not only have the potential to enthuse pupils but also teachers.

The case studies program had an impact on student choices about their learning, much like the impacts of research-led teaching in universities (Lindsay *et al.* 2002). Focus group participants agreed that the case studies, by presenting interesting research outside the curriculum, influenced students to choose geography as their university subject - a finding which echoes experiences of more intensive programs with smaller cohorts of students where students attend university-organized events (Houser *et al*. 2015). Interestingly, one focus group

participant suggested that the research case studies had played a key part in causing at least two students to select the university as their first choice university. Additionally, the research case studies are having an influence on decisions about learning within school courses. A focus group participant described how *'one pupil loves the idea of the route not the destination/origin* [one of the case study themes] *for their Extended Essay and will be using the idea with wheelchair access'*. In this example the student has drawn upon the case study to inform their choice of individual research topic.

In our review of selected literature on the impacts of research-led teaching in universities we found an impact on student perspectives on the credibility of their education (Lindsay *et al.* 2002) but there was no indication of this in a school context. This difference almost certainly reflects the highly different contexts of schools and universities, whereby in schools, research-led teaching is given almost no importance and in universities it is the primary mantra. It is also worth noting that neither of the two main, albeit contested (Hattie and Marsh 1996), weaknesses of research-led teaching identified in universities appear to apply in the school context. Given that teachers are not producing the research and are instead staying up-to-date through dissemination by academics, they do not lack time or the desire to engage with students (Jenkins *et al.* 2008), nor do they have a single research interest which dominates the curriculum (Jenkins *et al.* 2008). In fact, such an impact is highly unlikely in the school context where the curriculum is more tightly defined.

BRIDGING THE PHYSICAL DIVIDE BETWEEN UNIVERSITIES AND SCHOOLS

One of the objectives of the research case studies program was to bridge the knowledge and physical divide that exists between universities and schools. In the discussion of program impacts we established that one of the major benefits has been a closing of the knowledge gap, therefore this final thematic section of the paper focuses on the physical divide.

In our earlier discussion we found widespread engagement with the project website and while this is the least-effort form of engagement it marks an important step forward in bridging the physical divide – at least virtually. A more in-depth form of engagement has been achieved with the 89 teachers who attended or expressed an interest in attending the annual research case studies events between 2012 and 2015. It is through this more intensive day of engagement, and associated communications, that a richer relationship has been developed between the university and schools. Teachers who had attended the geographical case studies event and who responded to the online survey praised the willingness of academics at the university to engage with schools and *'give something back'* to teachers. This engagement was set in a wider context in which teachers often faced difficulties getting universities to engage. An example of another UK university was mentioned in focus group discussions, where the geography department was seen as more reluctant to engage. This is a trend that Yarwood and Davison (2007) described in their account of diminishing engagement by academics with Geographical Association branches. Teachers also commented on the degree of engagement pursued through the case studies program. They suggested that the provision of research-based case studies as ready-made teaching materials was particular to the university and goes beyond the more typical form of engagement of guest lectures.

The research case studies program has also acted as a catalyst for further, unanticipated interactions between the university and schools. First, the university has developed links with the main association for school geography teachers in the UK (the Geographical Association). Several teachers who attended the case studies event were involved in the association and this led to the university hosting an association quiz for school students and in three consecutive years lecturers from the university have been invited to present at the annual association conference which attracts approximately 750 teachers. The second development has been an increase in guest lectures being delivered at individual schools in the region, largely in schools

where teachers have attended the case studies event but also through a snowballing effect in which staff are invited on the basis of a recommendation by another school. Interestingly, a third form of engagement has been direct interactions between pupils and lecturers. For example, one teacher in a feedback email explained: *'I set up a Skype link with (…) one of your lecturers, and the students asked her a range of questions etc. and conducted a mini-interview. This seemed to work really well.'* In this instance we see the research-led teaching program develop into a form of research-based learning (Healey 2005). Finally, the case studies program has boosted awareness of the university's willingness and ability to engage with schools and this led directly to two members of the team being invited to sit on advisory boards, guiding the redesign of school geography syllabi.

CONCLUSION

The geographical research case studies program aimed to enhance research-led teaching in schools and bridge the divide between the university and schools. In this final section of the paper we reflect on the extent to which these goals were met and the potential implications for geography education more broadly.

Our small-scale study suggests that the impacts of research-led teaching in schools are very positive. Most of the benefits of research-led teaching documented in universities were present in the schools surveyed in this study. Teachers and students had access to up-to-date knowledge and the research influenced student decisions about their education, not least in the decision to pursue bachelor degree programs in geography. However, the impact which stands out the most, in terms of the vigor with which perceptions were expressed, is the heightened enthusiasm and engagement with the subject experienced by students but particularly by teachers.

Did the research-led teaching program succeed in repairing *'some of the burnt bridges separating university geography off from the world of teachers, schools, teacher-trainers and curriculum authorities'* (Castree 2011, 5)? The program is small in scale and cannot bridge the great divide alone, however it has shown the potential for research-led teaching programs to contribute towards the repair. Many teachers and students engaged with the university in a fairly minimal way through the online resource and in greater depth through the case studies event. Our study shows that deeper engagement can also act as a catalyst for further unanticipated interactions. In this particular program, links with the Geographical Association were improved, guest lectures were delivered in individual schools, direct contact was established between school pupils and academics, and academics became involved in guiding the redesign of school geography syllabi. By beginning to build bridges and initiating a process of engagement with schools, it seems further engagement is inevitable as the demand undoubtedly exists within schools.

We recognize that this paper focuses on a single program and is based upon a small-scale study but a clear argument begins to emerge for research-led teaching to play a more prominent role in school geography classrooms. If research-led teaching is to be enhanced in schools, universities will need to play a key facilitating role, bridging the physical and knowledge divides that have emerged. We would encourage other universities to begin to work more closely with schools, focusing on the transfer of research knowledge. Importantly, future research on these developments could learn from the methodological limitations of this study by seeking the views of those we are attempting to benefit, namely school pupils. Finally, Castree (2011) called for bridges to be repaired between universities and schools. We propose that it is not only repairs that are required: new bridges can be built where links have never existed and they would benefit from being built upon the nexus of teaching and research.

NOTES

1. Healey & Jenkins (2006) refer to 'soft' and 'hard' disciplines to describe social sciences and physical sciences respectively but in this paper we use the formal discipline names, given the potential negative connotations of the terms adopted by Healey & Jenkins (2006).
2. It is worth acknowledging that many studies have explored the impacts of research-oriented, research-tutored and research-based teaching (Fuller *et al*. 2014; Ishayama 2002; Houser *et al*. 2014). For example, articles investigate the impacts of research dissertations on student learning. However, these are not reviewed in the current paper due to the focus of the case studies program on a research-led approach.
3. Case studies can be found on the program website: www.cardiff.ac.uk/geography-planning/about-us/cardiff-case-studies
4. The online survey made reference to 'Key Stages' rather than student ages. A Key Stage is a stage of the state education system in England, Wales and Northern Ireland. In secondary schools students would study at key stages 3 (ages 11-14), 4 (ages 14-16) and 5 (ages 16-18).

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