What Kind of Geography Education Research is There?

To cite this article: Hua Hui Josef Tan 2019 IOP Conf. Ser.: Earth Environ. Sci. 338 012046

View the article online for updates and enhancements.
What Kind of Geography Education Research is There?

Josef Tan Hua Hui

1Geography Unit, Ministry of Education, Singapore

Email: josef_tan@moe.gov.sg

Abstract. The broad aim of this paper is to support teachers in the use of published research in improving geography instruction. Despite the promotion of research-based (or evidence-based) practices, not many teachers prioritise reading research. This is because making research-based instructional decisions can be fairly time consuming. Research findings need to be combined with teachers' value judgment, and their tacit understanding of students' needs. As such, the potential of GER to improve geography instruction remains largely untapped. This paper seeks to encourage geography teachers to read GER, by describing what kind of GER is available for what kind of improvements in geography education. Three high quality GER journals were identified using the CiteScore and Journal Impact Factor metrics. Peer-reviewed articles published between 2000 and 2016 in these three journals were analysed quantitatively and qualitatively. The results show that there is a large volume of GER that practitioners could consult. Although most GER scholars are based in a small number of English-speaking countries, GER covers cases from diverse parts of the world. Also, GER is most concerned with issues related to curriculum development and spatial thinking. These are topics relevant to both policymakers and classroom teachers. However, GER has not comprehensively evaluated the efficacy of different instructional approaches. As such, teachers may need to search beyond GER to achieve improvements in classroom instruction.

1. Introduction

The broad aim of this paper - to support practitioners in the use of published research in geography education, was formulated in response to the promotion of research-based (or evidence-based) practices internationally in the last decade [1,2,3,4,5]. In the United Kingdom for instance, its Department of Education provided in 2011, a £125 million grant to the Education Endowment Foundation (EEF), to fund studies on the scalability of education research (Cabinet Office, 2013) [6]. The EEF has since built an online tool by synthesizing 10,000 research studies, enabling schools to compare the cost and impact of different educational interventions (ibid.). The effort to promote research-based practices are often multi-pronged, involving multiple agencies and stakeholders. In the United States for example, the combination of legislation (e.g. No Child Left Behind Act), creation of educational standards (e.g. Common Core Standards) and an increased reliance on evidence in assessing grant applications (e.g. Investing in Innovation Fund – i3) pushes policymakers and educators to make greater use of research (Daly & Finnigan, 2014) [1]. There had also been a greater emphasis in communicating research to practitioners (e.g. school leaders, teachers, counsellors etc.). In Singapore for instance, the national education research agency, National Institute of Education (NIE), had been tasked with conducting milestone professional development programmes for educators at key stages of their career (e.g. Management and Leadership Studies Programme for middle managers, and Leaders in Education Programme for vice-principals) (Foo, Dong, Koon, & Choy, 2015) [7]. Complementing NIE’s professional development programmes are online platforms, created to highlight research-based recommendations by NIE’s faculty (e.g. NIE Research Brief Series and SingTeach e-magazine) (National Institute of Education, 2015) [8]. However, for most practitioners and policymakers, using research to improve instructional practice is not a straightforward process. Education policies and instructional practices cannot be exclusively
based on research. It is instead necessary to combine research evidence with practitioners’ value judgment, tacit knowledge and experience of students’ needs in the classroom (Biesta, 2010; Hammersley, 2005; Poon, 2012; Roberts, 2010) [9,10,11,12]. These are on top of the challenges teachers face in reading education research. In a survey of 1,153 practitioners based in Canada, Lysenko et al. (2016) [13] found that teachers infrequently used of research-based information - defined as “free-circulating commodity produced by professional researchers (p38)” . In fact, 202 respondents preferred the exchange of ideas among practitioners, while 99 believe that research is irrelevant due to their limited ability to understand research articles (Ibid.). The findings were similar in another survey of 183 geography teachers in Turkey, where only a small number (34.1%) of mainly younger teachers, believe that geography education research (GER) is relevant to their practice (İncekara, 2013) [14].

To transform propositional research knowledge into practical pedagogical knowledge, practitioners require sufficient time and the requisite abilities (Cain, 2015) [15]. Given the fast pace of school operations, practitioners will always prefer quick fix ideas from their peers rather than go through “[[the process of conceptual development, relating research findings to specific cases and imaginative diffusion, [that require] many thoughtful discussions” (Ibid, p38). My specific objective in this paper is to hasten this knowledge transformation process by:

- a) describing the characteristics of GER
- b) exploring the nature published research in different geography education journals

It is hoped that the insights provided in this paper will motivate my target audience - geography teachers to read GER, and incorporate GER findings in their practices. In short, my research question is - what kind of GER is available for what kind of improvements in geography education?

The next section provides an overview of the current variety of GER, and its progress since the 1990s. Following this, I explain my mixed methods design, including the selection of three journals for my study. Quantitative (QUAN) results are presented before I discuss my qualitative (QUAL) analysis. I conclude with a summary of the characteristics and nature of GER published in the three journals, and considerations for teachers.

**Geography Education Research: Progress and Variety**

GER is on an upward trend internationally. The volume of GER had increased significantly in the last three decades, with the majority aimed at improving instructional practices, largely focused on issues related to teaching methods and student learning [16,17,18]. The quality of GER had also improved with more studies adopting empirically-based methods, making reference to educational theories [16,19]. The value of researcher-practitioner collaboration is now widely acknowledged (Bednarz, 2002; Brooks, 2010) [20,21]. In many countries, action research is now the mainstream approach in studying effects of national curricular changes (Gerber & Williams, 2000) [18]. GER had also kept up with advancement in education technology with an increasing number of studies conducted using GIS and the World Wide Web (Ibid.), though research in computer-aided geography education is still relatively small (Geĉit, 2010) [17].

Despite the progress achieved in the past three decades, there are major areas for improvement. GER is perceived to be in the incipient stage of development, characterized by individual researchers operating in isolation, often adopting idiosyncratic rather than more enduring aims (Butt, 2002; Williams, 1998) [22,23]. Additionally, GER had been criticized as lacking replication studies, and failing to adopt rigorous methodology such as controlled experimental design, which severely limits the application of GER (Bednarz, Heffron, & Huynh, 2013) [24]. Underfunding also continues to handicap researchers in some countries (Gerber & Williams, 2000; Lambert, 2010) [18,25], contributing to lack of interdisciplinary efforts that draw upon theories from other disciplines such as developmental psychology (Bednarz et al., 2013; Geĉit, 2010) [24,17]. As a result, the majority of GER are conducted on single cases, with few attempts at large scale comparative projects that are capable of producing generalizations across different cultural contexts (Bednarz et al., 2013; Gerber & Williams, 2000) [24,18].
Reflecting larger trends in education research in the United States (see National Research Council, 2002) [4], whose GER community had campaigned for more systematic and scientific approaches, emphasizing the importance for GER to enable large scale improvements. An exemplar quote from Roger Downs’ speech, at a Presidential Plenary Session, during the 1993 Annual Meeting of the Association of American Geographers (AAG) is provided below.

“Which should come first: an understanding of latitude and longitude or an understanding of coordinate systems in general… Are there prerequisites for understanding latitude and longitude… how does that understanding relate to an understanding of… time zones, diurnal relations between Earth and Sun…?”

(Downs, 1994a, pp. 176–77)

Downs exhorted geographers to contribute towards a body of empirical research that would guide geography educators (Downs, 1994a) [26]. Downs also argued that progress in geography education needs to be measured against a set of baseline research data that measures the subject’s status, classroom practices and students’ geographic skills and knowledge (Downs, 1994b) [27]. Two decades on, a road map for GER was launched (with support from the US National Science Foundation) outlining strategies to maximize the cumulative impact of GER in the years ahead (Bednarz et al., 2013) [24]. A key recommendation is to adopt experimental research designs to assess the efficacy of proposed interventions, and harness statistics to produce generalizations using large sample sizes (Ibid.).

There are however differing perspectives of GER in other parts of the world, as to how the field should progress hereon. In England for instance, members of the Geography Education Research Collective (GEReCo) had pointed out that because funding for GER is limited, the scope of research projects will likely remain small and undertaken by single researchers or by small groups [21,29]. GERECo is a small group of distinguished geography education researchers publishes regularly in academic and professional journals [30]. There is also skepticism towards amassing large datasets about the efficacy of interventions in geography education in England, since there is already a substantial and growing body of published research in other subjects (e.g. Mathematics) that geography education can draw upon [25]. As such, scholars in England argued that GER will achieve greater success by adopting advanced qualitative research methods, to understand the complexities of teaching and learning, enabling practices to be ‘informed by’ rather than ‘based on’ research [29,12].

2. Methodology

My study adopted a mixed methodology, where qualitative (QUAN) and quantitative (QUAL) analyses are combined to achieve a more complete investigation, thus providing greater insights into bodies of GER knowledge [31,32]. My research was guided by a pragmatic approach that is less concerned about what is real or socially constructed, but more focused on adopting the best mixed of methods to answer my research question [33]. As my aim is to describe and explore GER, rather than provide an explanation or synthesis). An integrative research design is used, giving equal emphasis to both QUAN and QUAL methods such that the strength of one offsets the weakness of the other [34]. Overall, my QUAN results seek to generalize the main characteristics of GER, while my QUAL findings sheds light on the nature of GER published between 2014 and 2016 (Ibid.). Both sets of information will help teachers to locate high quality GER quickly, better make sense of research findings, and perhaps apply GER more effectively.

Purposive sampling is used to identify three high quality GER journals - Geography, International Research on Geographical and Environmental Education (IRGEE) and Journal of Geography (JOG). The quality of published research in each journal as reviewed by Jones (2001) [35], was ascertained using CiteScore and Journal Impact Factor metrics published by Elsevier and Thomson Reuters respectively. Only five journals reviewed by Jones (2001) [35] are ranked by Elsevier, and among them four are ranked by Thomson Reuters (see Table 1). As my main audience is school geography teachers, the Journal of Geography in Higher Education that publishes GER in university settings
solely was excluded. *Teaching Geography* was also left out due to its relatively low CiteScore in 2015 (i.e. 0.03). Furthermore, *Teaching Geography* is not ranked by Thomson Reuter.

**Table 1. CiteScore Comparison of English Language Geography Education Journals**

| English Language Journals for Geography Education (Jones, 2001) | Publisher | CiteScore 2015 | Journal Impact Factor 2015 |
|---------------------------------------------------------------|-----------|----------------|--------------------------|
| Journal of Geography*                                         | National Council for Geography Education (USA) | 1.79 | 1.213 |
| Journal of Geography in Higher Education                      | Taylor and Francis | 1.36 | 1.034 |
| International Research in Geographical and Environmental Education* | Routledge | 0.79 | Unavailable |
| Geography*                                                    | Geographical Association (UK) | 0.63 | 0.719 |
| Teaching Geography                                            | Geographical Association (UK) | 0.03 | Not indexed |
| Primary Geography                                             | Geographical Association (UK) | | |
| The Monograph                                                 | Ontario Association for Geographic and Environmental Education | Not indexed |
| Geographical Education                                        | Australian Geography Teachers Association | | |
| Research in Geographic Education                               | Gilbert M. Grosvenor Center for Geographic Education | | |
| New Zealand Journal of Geography                               | New Zealand Geographical Society | Discontinued |
| Geographical Viewpoint                                         | Association of Geography Teachers of Ireland | | |

*Journals selected for my study

The coverage of the selected journals by no means represent the entire corpus of GER. High quality GER can certainly be found among other education journals, edited volumes and unpublished theses. Nevertheless, the content of these selected journals captures the coordinated efforts of various GER communities in promoting and improving geography education. These journals are therefore ideal starting points in a teacher’s journey of reading GER.

Effort was made to provide equal emphasis to both QUAN and QUAL data analysis. Dataset on the selected journals between 2000 and 2016, was obtained from Scopus and Web of Science. Patterns and
trends in the **volume of research, authorship, and level of collaboration** were examined or inferred using descriptive statistics. QUAL data was transformed into QUAN data through content analysis of abstracts between 2000 and 2016, using the online word cloud generator TAGUL (www.tagul.com) (Cohen et al., 2013) [32]. Common words and numbers were excluded, and stemming was enabled to reduce words to their root form. The 10 most frequently occurring words in the respective journals are then visualized proportionally using word clouds. Only abstracts of peer-reviewed articles were considered. Editorials and reviews were excluded. Abstracts from all 426 articles from JOG were analyzed. However, not all articles were accompanied with abstracts for Geography and IRGEE. As such, abstracts of 321 out of 427 articles in Geography and 356 out of 416 articles in IRGEE were analyzed. To achieve a deep understanding of GER conducted in recent years, analytic codes were drawn from the word clouds to qualitatively examine selected articles published between 2014 and 2016 in all three journals. 119 articles that were relevant to primary and secondary (or K-12) geography education were shortlisted (27 articles from Geography, 53 from IRGEE, 39 from JOG). Five randomly selected articles from each journal were then picked out for QUAL analysis.

### 3. Results of QUAN Data Analysis

The three journals are mostly comparable regarding the volume of published research during the study period (i.e. 2000 to 2016). Each journal had published a total of about 400 articles (Geography – 406, IRGEE – 416, JOG – 429), averaging about 25 articles a year. Only JOG managed to consistently publish 20 plus articles yearly (except in 2002 when it published 19 articles) (see Figure 1). In contrast, the volume of published research in Geography and IRGEE varies considerably year-to-year. Geography had published 41 articles in 2000, but only managed 14 articles in consecutive years 2012 and 2013. Similarly, IRGEE’s record reflects more productive (e.g. 30 plus articles from 2010 to 2012, and 2014) and leaner periods (e.g. less than 20 articles in 2000, 2004, 2005 and 2008)

![Figure 1. Number of Articles Published in Geography, IRGEE and JOG (2000 to 2016)](image-url)

Authors in all three journals are based in a limited number of countries. The large majority of authors who had published in Geography and JOG are based in one country, England (65%) and United States (78%) respectively (see Figures 2A and 2B). For Geography, many of the remaining authors are based in English-speaking countries with close ties to England, for instance South Africa (6%) and Australia (4%). For JOG in contrast, the top contributing countries include non-English speaking countries.
namely, South Korea (2%) and Turkey (1%). The authorship of IRGEE is most diverse, with authors based in continental Europe as well (i.e. Netherlands – 5% and Germany – 5%), though most authors are based in just three English-speaking countries - United Kingdom (22%), United States (14%) and Australia (13%) (see Figure 2C).

Figure 2A. Top Six Contributing Countries, Geography (2000 to 2016)

Figure 2B: Top Six Contributing Countries, JOG (2000 to 2016)
The relative diversity of IRGEE is also evident from its higher number of contributing institutions. 25% of articles in IRGEE were contributed by 14 institutions as compared to just seven for JOG and five for Geography. Correspondingly, IRGEE has the least number of institutions (3) contributing 10 or more articles as compared to Geography (4) and JOG (8) (see Figure 3). This suggests that IRGEE has a more even spread of articles contributed by institutions in different countries. While the top three contributing institutions for IRGEE are spread out across different parts of the world (University of London - England, Queensland University of Technology - Australia and Vrije Universiteit Amsterdam - Netherlands), the top contributing institutions for Geography and JOG are more concentrated. For Geography, two central London institutions contributed about 15% (64) of all articles during the study period - University of London (40) and University College London (24). For JOG, four institutions in Texas state contributed about 15% (71) of all articles – Texas State University System (22), Texas State University San Marcos (20), Texas A&M University System (15) and Texas A&M University College Station (14).
While the most published authors in all three journals are respected GER leaders (see Figure 4A), few scholars contribute on a regular basis and co-authorship is not common. The only author who had contributed more than 10 articles (in IRGEE) during the study period was Joop Van Der Schee (12), the immediate past co-chairperson of the International Geographical Union Commission on Geographical Education (IGU-CGE). The IGU-CGE is also the sponsor of IRGEE. The top contributor in JOG is Sarah Witham Bednarz (9), who was the chairperson of the Geography Education Research Committee of the Road Map for 21st Century Geography Education Project. Sarah is also a past president of the Association of American Geographers (AAG). David Lambert contributed the most number of articles in Geography (7). Geography is published by the Geographical Association (GA) in England, which was led by David as its Chief Executive between 2002 and 2012. Co-authorship is more common in JOG (with 276 articles are written by two or more authors), as compared to Geography and IRGEE (see Figure 4B). Most co-authored articles are written by two authors, while articles written by four or more authors are especially rare.
Issues covered by the three journals are mostly different, though some similarities exist. The school geography ‘curriculum’ received much attention in Geography, so do topics and themes in urban geography (see Figure 5A). The role of ‘technology’ and ‘government policies’ are covered frequently, and ‘natural environments’ feature in discussions on ‘sustainable development’. Many articles are also explicit about the ‘scale’ of their study, collectively addressing a wide range of scales. Like Geography, articles in IRGEE are concerned about issues related to the school ‘curriculum’ (see Figure 5B). In addition, IRGEE’s coverage extends to ‘environmental’ education, which is not part of geography education in some countries. Rather than specific topics or themes in the subject, articles in IRGEE are more interested in students’ ‘attitude’, ‘social environment’ and how they develop ‘conceptual understanding’. Many articles examine ‘instructional approaches’ and report on their effectiveness. Articles frequently report on the assessment of ‘pilot or new educational projects’ and courses’. Unlike Geography, IRGEE’s coverage often extends to geography education at university level. Distinct from Geography and IRGEE, more articles in JOG study the use of ‘maps’, ‘geographic information system (GIS)’ and ‘spatial thinking’ (see Figure 5C). Like IRGEE, students’ ‘conceptual understanding’ is a key focus, similarly JOG regularly reports on the success of ‘new or pilot programmes’ including those.
implemented at university level. Unlike Geography and IRGEE, articles in JOG reflect an emphasis on ‘skills development’ and ‘data literacy’. The most common topics or themes discussed in JOG are drawn from ‘cultural and regional geography’, rather than ‘urban geography’ as seen in Geography.
Discussion of QUAL Data Analysis

All five randomly selected articles from *Geography* explored the ‘curriculum’[36,37,38,39] and ‘instructional approaches’[40] relevant to contexts in England and the United States. Evans (2016) [37] reviewed the reforms to the A level geography specifications in England, explained the policy work flows and processes, and accounted for the prescribed content. Addressing recent curricular changes as well, Downs (2016) [36] showed how the evolution of geospatial technologies had impacted K-12 geography education in the United States, referring to the increased emphasis of spatial thinking and GIS in the 2012 U.S. National Geography Standards. Recognizing the imminent challenges posed by climate change, fossil fuel use and ecological limits of growth, Hicks (2014) [38] argued for a curriculum that enables students to explore their feeling, and for the prescribed content to include alternative futures. Instead of curricular changes, Maude (2016) [39] focused on the potential of (geographical) concepts in the current curriculum in England that could help students acquire ‘powerful knowledge’, a concept coined by an education sociologist - Michael Young (2009) [41]. Marvell and Simms (2016) [40] reported the success of their fieldwork approach, which encourages student self-direction and deep immersion at field sites.

All five articles analyzed in *Geography* adopted constructivist approaches, and used mostly QUAL data. Only Marvell and Simms (2016) [40] collected primary data to support their argument, analyzing diary entries to understand university students’ experience of the fieldwork, and how they gain a sense of place at different field sites. The other four articles referred mainly to secondary data including research articles. Fellow geographers, education researchers, government agencies and think tanks were common sources of data. Evans (2016) [37], Marvell and Smith (2016) [52] and Maude (2016) [39] for example explained concepts and ideas in geography, referring to respected geographers like Derek Gregory, Peter Haggett, Tim Cresswell, and Yi-Fu Tuan. Likewise, Hicks (2014) referred to a special issue in an established geography journal – Geoforum, to show that geographers are beginning to research on peak oil. Going beyond academia, Downs (2016) [36] referred to data collected by the Pew Research Centre to show the importance of technology in students’ everyday life.

In contrast to *Geography*, the five articles randomly selected from IRGEE had a wider range of research questions that reflected practical concerns in different countries. Two articles provided critiques of the national curriculum in Singapore and India, uncovering areas for improvement for the respective jurisdictions (Chang, 2014; Mishra, 2015) [42,43]. Likewise, two other articles that examined the subject expertise and experience of geography teachers in Chile and Ireland, provided insights for consideration by agencies responsible for teacher training agencies in the respective countries (Dolan, Waldron, Pike, & Greenwood, 2014; Salinas-Silva, Arenas-Martija, & Margalef-García, 2016) [44,45]. Similarly, the last article highlights implications for policymakers in Iran, by analyzing factors influencing the understanding of global climate change among Iranian university students (Salehi, Nejad, Mahmoudi, & Burkart, 2016) [46].

Similar to IRGEE, the five articles randomly selected from JOG had a wide range of research questions that are concerned about different aspects of geography education, and like IRGEE the articles drew upon materials and evidence from different countries. Murphy and Hare (2016) [47] argues for more disciplinary thinking, with the aid of GIS, in Advanced Placement Human Geography (AP HG) programs in the United States. Sharing the interest in GIS, Zhu et al. (2015) [48] tested an online map-based instructional tool that is developed using Google Earth API. In order to evaluate the use of GIS in Rwandan schools subsequently, Tomaszewski et al. (2014) [49] generated baseline QUAN data that measures secondary students’ spatial thinking ability. Two other articles explored student perceptions and teacher ability. Jan Bent et al. (2014) [50] explored the perception of geography instruction among primary students in Netherlands, highlighting implications related to inquiry-based approaches and teachers’ application of subject-specific knowledge. On the issue of subject-specific knowledge, Lane and...
Catling (2016) [51] identified major gaps in the understanding of tropical cyclones among preservice primary teachers in Australia, raising important considerations for teacher education providers.

Like IRGEE, articles in JOG deploy a range of research approaches, using QUAN and/or QUAL data. Tomaszewski et al. (2014) [49], being most concerned about the quality of QUAN data generated, modified a validated closed-ended multiple choice spatial thinking test to suit the context of geography education in Rwanda. Zhu et al. (2015) [48] also analyzed QUAN data collected from 150 university students, to demonstrate the effectiveness of their online map-based instructional tool. Lane and Catling (2016) [51] used a mixed method QUAN-QUAL design, first surveying 430 preservice teachers using a questionnaire, then validating the questionnaire findings by interviewing a purposive sample of 29 respondents. The use of QUAN and QUAL data was also evident in the article by Jan Bent et al. (2014) [50], though the study was primarily QUAL in nature. Interview transcripts were coded, then tabulated using percentage measurements, to show the gap between students’ preferred learning approach as compared to current practices.

Conclusion

In this paper, I have located the major GER communities and their bodies of knowledge residing in three journals. My QUAN results show that practitioners have an abundant of published research to consult in all three journals, confirming the observation that the volume of GER is substantial [19,17,18]. Despite this voluminous collection, practitioners should not expect GER to be representative of perspectives on geography education worldwide, since GER scholars are largely based in a small number of mostly English-speaking countries. Nevertheless, practitioners can expect to find cases from various parts of the world from these journals, as my QUAL analysis of articles in IRGEE and JOG shows an international coverage of GER. The 10 randomly selected articles from both IRGEE and JOG (from 2014 to 2016) examined geography education in 10 different countries from six major world regions (four from Asia, two from Europe, one each from Africa, Australasia, North and South America). While the diversity is positive, teachers must grapple with the relevance of studies conducted in other countries. What is the relevance of say spatial thinking ability among Rwandan students to a geography teacher in Singapore? Despite its narrow focus (on geography education in England), it is possible that practitioners based in the Commonwealth will find GER published in Geography more relevant. This is due to Britain’s historical influence on education policies in former British colonies.

My QUAN results also identified major themes and topics frequently covered by the three journals (e.g. curricular matters in Geography and IRGEE, spatial thinking in JOG). This is corroborated by my QUAL analysis that revealed in-depth studies on curricular matters in Geography (England and United States) and IRGEE (Singapore and India). GER of this nature are more relevant to practitioners who are responsible for planning at the macro level (e.g. state, school district or cluster). On the other hand, classroom teachers may benefit more from reading GER published in JOG on topics related to spatial thinking, and the use of maps and GIS during instruction.

The large majority of practitioners are classroom teachers who are most concerned with what instructional strategies or tools works (or do not work). Unfortunately, my QUAL analysis did not uncover much GER that evaluated ‘what works’. 13 out of 15 articles either described ‘what is the current situation with teachers or students’ [50,45] or argued ‘what might work better’ [38,39]. It is also probable that the methods adopted by two articles assessing efficacy of instructional approaches [40,48] will fall short of what is deem as sufficiently rigorous for large
scale application [24]. Still, my QUAL analysis shows that GER communities are progressing beyond the incipient stage of research of development [23], with efforts to generate baseline data about students and teachers [44,50,51,46,49] and attempts in replicating previous studies in different cultural contexts [43,49]. At this juncture, it is fair to conclude that at least in the near term, geography teachers will need to search beyond GER to achieve significant improvements in classroom instruction.

References

[1] Daly A J and Finnigan K S 2014 Beginning the Journey: Research Evidence from the Schoolhouse Door to Capitol Hill In Using Research in Evidence in Education pp 1 – 6 Cham: Springer
[2] Davies P 1999 What is Evidence-based Education? British Journal of Educational Studies
[3] Hargreaves D H 1997 In Defence of Research for Evidence based Teaching: a rejoinder to Martyn Hammersley British Educational Research Journal 234 405–419
[4] National Research Council 2002 Scientific research in education National Academies Press
[5] Slavin R E 2004 2002 Dewitt Wallace-Reader’s Digest Distinguished Lecture Evidence-Based Education Policies Educational Researcher 317 15–21
[6] Cabinet Office 2013 What Works Network Retrieved February 10 2017 from https://www.gov.uk/guidance/what-works-network
[7] Foo D F S Dong T N Koon B S W and Choy W K W 2015 A review of Singapore principals ’ leadership qualities styles and roles Journal of Education Administration 534 512–533
[8] National Institute of Education 2015 NIE Research Brief is now available online Retrieved February 10 2017 from http://www.nie.edu.sg/news-detail/nie-research-brief-series-now-available-online-0
[9] Biesta G J J 2010 Why “What Works” Still Won’t Work: From Evidence-Based Education to Value-Based Education Studies in Philosophy and Education 295 491–503
[10] Hammersley M 2005 The Myth of Research-Based Practice : The Critical Case of Educational Inquiry The Myth of Research-Based Practice: The Critical Case of Educational Inquiry International Journal of Social Research Methodology 8 317–330
[11] Poon C L 2012 Fourth way in action : translation of research into policy and practice Educational Research for Policy and Practice 111 19–25
[12] Roberts M 2010 What is “evidence-based practice” in geography education? International Research in Geographical and Environmental Education 192 91–95
[13] Lysenko L V Abrami P C Bernard R M and Dagenais C 2016 Research use in education : an online survey of school practitioners Brock Education Journal 251 35–54
[14] İncekara S 2013 Geography education research in turkey: A teacher’s perspective Egitim ve Bilim 38 167 3–16
[15] Cain T 2015 Teachers’ engagement with published research: addressing the knowledge problem The Curriculum Journal 57 1–22
[16] Bednarz S W 2000 Geography education research in the Journal of Geography 1988-1997 International Research in Geographical and Environmental Education 92 128–140
[17] Geçit Y 2010 Primary tendencies in research on geography education Kuram ve
[18] Gerber R and Williams M 2000 Overview and international perspectives In A Kent Ed Reflective Practice in Geography Teaching pp 209–218 London: Sage
[19] Rutherford D 2002 Building Empirically-based Theory in Geography Education International Research in Geographical and Environmental Education 113 283–286
[20] Bednarz S W 2002 Using Action Research to Implement the National Geography Standards: Teachers as Researchers Journal of Geography 101 103–111
[21] Brooks C 2010 How does one become a researcher in geography education? *International Research in Geographical and Environmental Education* **192** 115–118

[22] Butt G 2002 *Reflective teaching of geography 11-18: Meeting standards and applying research* London: Continuum

[23] Williams M 1998 A review of research in geographical education In A Kent Ed *Issues for Research in Geographical Education Research Forum I* pp 1–10 London: University of London Institute of Education

[24] Bednarz S W Heffron S and Huynh N T 2013 *A Road Map for 21st Century Geography Education Project: Geography Education Research Report from the Geography Education Research Committee of the Road Map for 21st Century Geography Education Project* Washington DC

[25] Lambert D 2010 Geography education research and why it matters *International Research*

[26] Downs R M 1994a Being and Becoming a Geographer: An Agenda for Geography Education *Annals of the Association of American Geographers* **842** 175–191

[27] Downs R M 1994b The need for research in geography education: it would be nice to have some data *Journal of Geography* **931** 57–60

[28] Butt G 2010a Perspectives on research in geography education *International Research in Geographical and Environmental Education* **192** 79–82

[29] Butt G 2010b Which methods are best suited to the production of high-quality research in geography education? *International Research in Geographical and Environmental Education* **192** 103–107

[30] Geography Education Research Collective nd *Who we are* Retrieved February 25 2017 from https://gerecoorg/whoweare/

[31] Check J and Schutt R K 2012 *Research Methods in Education* Thousand Oaks: Sage

[32] Cohen L Manion L and Morrison K 2013 *Research methods in education* Oxon: Routledge

[33] Lodico M G Spaulding D T and Voegtle K H 2010 *Methods in Educational Research* San Francisco: Jossey-Bass

[34] McMillan J H and Schumacher S 2010 *Research in Education* Upper Saddle River: Pearson

[35] Jones M C 2001 *A Guide to English-Language Journals for Geography Education* *Journal of Geography* **1001** 14–23

[36] Downs R M 2016 Bringing geography back to life : the role of the geospatial revolution in the US school system *Geography* **22** 77–85

[37] Evans M 2016 Reflections on the changes to A levels *Geography* **101** 156–163

[38] Hicks D 2014 A geography of hope *Geography* **99** 5–12

[39] Maude A 2016 What might powerful geographical knowledge look *Geography* **101** 70–77

[40] Marvell A and Simm D 2016 Unravelling the geographical palimpsest through fieldwork : discovering a sense of place *Geography* **101** 125–136

[41] Young M 2009 Education globalisation and the “voice of knowledge” *Journal of Education and Work* **223** 193–204

[42] Chang C-H 2014 Is Singapore’s school geography becoming too responsive to the changing needs of society? *International Research in Geographical and Environmental Education* **23** 25–39

[43] Mishra R K 2015 Mapping the knowledge topography: a critical appraisal of geography textbook questions *International Research in Geographical and Environmental Education* **24** 118–130

[44] Dolan A M Waldron F Pike S and Greenwood R 2014 Student teachers’ reflections on prior experiences *International Research in Geographical and Environmental Education* **23** 314–330

[45] Salinas-Silva V Arenas-Martíja A and Margalef-García L 2016 Non-certified environment and geography subject expertise in Chilean rural educators *International Research in Geographical and Environmental Education* **25** 105–120

[46] Salehi S Nejad Z P Mahmoudi H d and Burkart S 2016 Knowledge of global climate change: view of Iranian university students *International Research in Geographical and Environmental Education* **25** 226–243
[47] Murphy A B and Hare P R 2016 The Nature of Geography and Its Perspectives in AP ® Human Geography Journal of Geography 115 95–100
[48] Zhu L Pan X and Gao G 2015 Assessing Place Location Knowledge Using a Virtual Globe Journal of Geography 134 1–9
[49] Tomaszewski B Vodacek A Parody R and Holt N 2014 Spatial Thinking Ability Assessment in Rwandan Secondary Schools: Baseline Results Journal of Geography 114 39–48
[50] Jan Bent G Bakx A and den Brok P 2014 Pupils’ Perceptions of Geography in Dutch Primary Schools: Goals Outcomes Classrooms Environment and Teacher Knowledge and Performance Journal of Geography 113 20–34
[51] Lane R and Catling S 2016 Preservice Primary Teachers’ Depth and Accuracy of Knowledge of Tropical Cyclones Journal of Geography 115 198–211
[52] Marvell, Alan D and Simm, David (2016) Unravelling the geographical palimpsest through fieldwork: discovering a sense of place. Geography, 101 (3)