

The “rightful place” of Physical Geography in Singapore’s School Geography Curriculum

Ng Mui Leng

Dunman High School, Singapore

Abstract

The role of physical geography within geography, its relationship to human geography, as well as its similarities and differences to the study of science have been topics of intense debate in geography. This article engages these debates as they apply to geography education in a highly urban Singapore context and argues that the nexus of physical and human geography provides students with the type of knowledge that best prepares them to be concerned and informed global citizens.

When the new Lower Secondary Geography Syllabus was launched in 2014, there was much talk among teachers that there seemed to be a downplaying of “pure” physical geography topics. Units on the traditional four spheres of physical geography (i.e. biosphere, lithosphere, atmosphere and hydrosphere) were taken out, though physical geography topics are still represented at the upper secondary level. This leads us, as geography educators, to ponder – is physical geography’s position in Singapore’s school geography curriculum at risk?

This paper draws on Duncan Hawley’s chapter “What is the rightful place of physical geography?” in *Debates in Geography Education* (Lambert & Jones,

2013). It appositely explores the “rightful place of physical geography” by presenting the different arguments about physical geography’s position with regard to other disciplines (especially the sciences) and within the discipline itself. It also critically reflects on the implications of Hawley’s arguments on the teaching and learning of geography in the Singapore context.

Earth Science - Geography or Science?

With the use of Earth science as an example, Hawley (2013) presents the various viewpoints on the debate of whether Earth science should be positioned in the geography or science curriculum. Physical geography topics such as climatology and weather, geology and ecosystems, which can be collectively known as Earth science, often overlap in content with the sciences (biology, chemistry and physics), leading to academics like Gregory (2002, cited in Hawley, 2013, p. 90) to question the appropriateness of physical geography within geography. Hawley also acknowledges King’s argument (2011) that Earth science’s “rightful place” in education should be in the science curriculum as international test data has shown that students in countries where

Earth science is an established science subject taught by teachers who specialise in Earth science, performed much better than the students who are from countries where “Earth science is not so strongly demarcated” (cited in Hawley, 2013 p. 91).

For this part of the debate on physical geography’s position with regard to the sciences, Hawley concurs with the complementary approach to understanding the physical aspects of the Earth, as advocated by the Geographical Association (2013, p. 91). He draws on the Geographical Association’s justification of how the “commonalities of earth science in physical geography and ‘deep’ earth science do not duplicate learning but are complementary, and both perspectives are advantageous and essential for effective learning” (Hawley, 2013 p. 92). Though Hawley (2103) does not openly state his stand, he seems to be supportive of this approach as he argues that it differentiates itself from the “conventional sciences” and is less generic than the usual Earth System science (p. 92).

I agree with Hawley that for the practical reason of better understanding and test scores, it is perhaps better that when teaching these topics, “deep science” concepts should be included and that they are better taught by science specialists. Based on my personal experiences as a student and now a teacher, I am aware of the difficulty faced when learning and teaching some of these physical geography topics such as atmospheric systems and processes, due to the lack in certain deep scientific conceptual understanding.

But with regard to the complementary approach towards Earth science, I have my reservations in seeing it as the “answer” to physical geography’s “rightful place.” The approach seems attractive as it aims to

create “a (holistic) synthesis of disciplines” (Hawley, 2013, p. 92) and it has even led to a curriculum map designed by the United Kingdom’s Department of Education (as part of the National Curriculum) that outlines “how Earth science concepts can be rationally divided into geography and science” (Hawley, 2013, p. 92). However, this may not be as helpful as it seems when it comes to execution. Suppose the issue-based approach is adopted, which in theory better facilitates the teaching of both geographical and scientific concepts, do we then arrange the content such that geography and science teachers go into the classroom at different stages of teaching the topic? The difficulty of this lies in the coordination and detailed planning that teachers from both departments need to have. But more importantly, we need to consider if this approach will help the students to learn better, or leave them in greater confusion.

One example to illustrate this is the concept of angle of incidence used in both physical geography and physics. In physics, the angle of incidence is simply known as the measure of angle deviation of a ray approaching a surface from its surface normal, which is if the ray is to reach the surface at a perpendicular angle (90°) (The Physics Classroom, 1996-2015). However, the same term is understood differently when it comes to explaining the amount of shortwave radiation received by the different latitudinal locations on the Earth’s surface. For the topic of energy budget under physical geography, the angle of incidence is the angle at which the Sun’s rays strike the Earth’s surface. Hence, if the Sun is positioned directly overhead or 90° from the horizon (Pidwirny & Jones, 1999-2014), the angle of incidence is understood to be 90° , and not 0° as understood in physics! Instead of

complementing their understanding of the concept from both disciplines, it may leave students confused. Hence, with such conceptual difficulties, the complementary approach may be more challenging than it seems.

Is there a weakening of physical geography in school curriculum?

For the second part of the debate, Hawley focuses on an ongoing issue within the discipline - physical geography's relationship with human geography. He argues that there is a "prevailing divide between human and physical geography in schools, even though the intention is for the context to create integration" (2013, p. 93). With reference to Brook's observations on a lesson on acid rain (2006), Hawley agrees with her argument that the "simple understanding of cause, effect and symptoms based on the physical process" (2013, p. 93) will leave students thinking that acid rain is a simple problem that can be solved easily without other wider considerations. Hence, physical processes must be considered in tandem with the "wider geographical (social) context" (Hawley 2013, p. 93) for students to really appreciate the nature of the issues.

However, he expressed concern that the teaching of physical geography in a wider social context may lead to superficial understandings of physical phenomena and instead of empowering students with the knowledge to make informed decisions, diminishes their chance to do so (Hawley, 2013, p. 96). Despite the development of physical geography at the tertiary level in recent years, this progress is not mirrored in the school curriculum. He quotes Inman's argument (2006) on the "poor understanding and lack of confidence and motivation with regard to physical

geography, resulting in students not having the foundation needed to move to higher education" (Hawley, 2013, p. 97).

I agree with both Hawley (2013) and Brooks (2006) that it is important for students to have a broader perspective on issues so as to better appreciate and understand them. Only with such a perspective and understanding will students be able to learn and mature to become informed individuals who can make good decisions. As a teacher in practice, I have to admit that the simple "causes-impacts-solutions" approach commonly used in the Singapore context, has its value too, especially for younger lower secondary students as it helps them to understand the issue in a more systematic and structured manner. However, this does not mean that wider geographical and social contexts cannot be brought into the picture. For example, when we ask students to consider the impacts of acid rain on people, economy and nature, they should already be considering how the physical processes related to acid rain will eventually affect both the physical and human environments. In this case, we are still able to address physical processes while further integrating physical and human geography. This does not necessarily lead to the weakening of physical geography within the curriculum, as Hawley contends.

Despite that, I have to agree with Inman (2006) that a poor foundation in physical geography is one of the main reasons why students in Singapore discontinue with geography at the Cambridge Advanced Level. For many students, physical geography is seemingly more difficult to understand compared to human geography, and they lack the confidence to continue with it at a higher level. However, I disagree with the

argument that this is related to the superficial understanding Hawley expressed worry about which stems from the teaching of physical geography in a wider geographical context. Rather than “blaming” sociocultural context for diluting the rigour of physical geography, I would like to suggest that, at least for the Singapore context, the lack of deep and comprehensive conceptual understanding in our secondary geography curriculum should be the main reason behind this. Take for example the topic of Variable Weather and Changing Climate in the Secondary Three syllabus where students are supposed to learn about the factors affecting temperature. Latitude, Altitude, Distance from the sea and Cloud cover are the four factors stated in the 2013 syllabus document for Ordinary Level Geography (Curriculum Planning and Development Division, 2013) and Albedo is excluded. However, as geographers, we all know that albedo is a key factor in explaining temperature as well, especially if we are to consider microclimates and issues such as urban heat island effect. If teachers choose to closely follow the national curriculum, which they should not be faulted for, then they would have missed out on the opportunity to develop clearer and deeper understandings of the topic.

The lack of deep and comprehensive conceptual understanding in our secondary geography curriculum is ironically demonstrated in the new lower secondary curriculum, where we see a clear reduction of physical geography content. The main themes for the new lower secondary curriculum are namely Environment and Resources (Secondary One) and Urban Living and Challenges (Secondary Two), with the latter focusing mainly on human geographical concepts. An example to demonstrate the shortcomings in physical geography content can be seen in the topic

of tropical rainforests. Students’ understanding, from my viewpoint, seems disjointed as they learn about the distribution and adaptations of tropical rainforests without explicit understanding of climatic zones. This may eventually affect students’ understanding of physical geography as they cannot truly appreciate how deforestation is affecting the climate and how this affects people around the world differently. Hence, I argue that if we are to build up students’ confidence in the subject, especially in physical geography, and to encourage more students to offer geography at a higher level, it is perhaps better to start them off early with a good basic foundation at the lower secondary level.

Paradigms in physical geography and how it affects teaching

In terms of his ideological position, Hawley argues that we should move away from a positivist approach to physical geography where nature is seen through a “set of stable, ‘fixed’ processes” as this denies the dynamic and ambiguous nature of the “real” world (2013, p. 98). He agrees with Atherton (2009) that paradigms should be explored in the school curriculum so that students can be “taught to deal with ambiguities and therefore, a constructivist approach is more appropriate to physical geography teaching” (Hawley, 2013, p. 99). He argues that the “rightful place” of physical geography is not a “fixed location” but one that changes as teachers and students “make sense of the world” (Hawley, 2013, p. 100), and hence, the “challenge for teachers is in deciding appropriate starting points and routes for study” (2013, p. 100). Teachers have to decide for themselves and for their students, how to best portray physical geography in order to develop understanding of the world they live in.

I agree with Hawley's push for a constructivist approach towards physical geography teaching. With widely available resources today, teachers should not be teaching facts and knowledge which otherwise can be accessed by students on their own. In the classroom, teachers hold the important responsibility of *making the curriculum* as experienced by students (Lambert & Morgan, 2010, p. 49) and curriculum making is defined as "the creative act of interpreting a curriculum specification or scheme of work and turning it into a coherent, challenging, engaging and enjoyable scheme of work" (Geographical Association, 2014). With reference to the curriculum-making model, a model first proposed in the Action Plan for Geography which shows "the three competing zones of influences on the teacher as she grapples with the 'in-between' work of translating a curriculum plan" (Lambert & Morgan, 2010, pp. 49-50), student experiences are just as essential as the teacher's pedagogy and Geography subject matter when it comes to curriculum making. Hence, we need to consider more carefully how the curriculum allows students to think geographically and how it takes the learners beyond what they already know. Teachers should consider a physical geography teaching that will equip students with the skills and enough knowledge to "make sense of a complex and dynamic physical world" (Hawley 2013, p. 99) and to construct new knowledge for themselves.

However, this is easier said than done as Hawley seems to assume that all teachers, students, schools and even parents, will appreciate and be ready for such an approach. Some teachers may lack the pedagogical understanding and confidence to include such "ambiguities" in their teaching. We may see this among

geography teachers in Singapore as there is a significant proportion who may not have much experience with physical geography beyond the Cambridge Ordinary Level syllabus, since the candidature for Advanced Level Geography has always been low. Without strong foundational knowledge, these teachers will have to make the effort to upgrade their content knowledge in order to facilitate and help students to construct their own knowledge. I have seen how young teachers who did not sit the 'A' Level Geography exams struggle with teaching more difficult physical geography topics such as plate tectonics and atmospheric processes as they themselves may not have understood the concepts accurately. In this case, how can we expect them to go beyond content delivery and be able to bring students to a higher level of knowledge construction?

Similarly, the constructivist approach towards physical geography teaching may not be the best approach for all students if we are to consider the varying starting points of students with different ability levels. Students with lower ability may not truly appreciate such an approach and may find it even more confusing to see the world they live in as ambiguous and dynamic. Another common critique of the constructivist approach in education is its seemingly elitist stance. It has been commented by critics that constructivism has been "most successful with children from privileged backgrounds who are fortunate in having outstanding teachers, committed parents, and rich home environments" while disadvantaged children who lack such resources, benefit more from more explicit instruction (Educational Broadcasting Corporation, 2004). Hence, as practitioners, we need to consider carefully from the viewpoint of our students what would be considered as

the most suitable learning approach for them

The wider implications for teaching and learning physical geography in the Singapore context

Hawley's representations of the "rightful place" of physical geography (2013) can be related back to Singapore's school curriculum. While things are less complicated here as Earth science is not offered as a school subject, we still face this question of the necessity of teaching physical geography in Singapore. Other than weather and climate, it seems to many (mainly non-Geographers, I would assume), as if other physical processes hardly affect us in this tiny tropical island without any major rivers, tectonic hazards and high mountains. So why teach and learn physical geography?

Being geography teachers, we can of course explain how, despite the absence and distance, these physical processes and features affect us in Singapore. But at this point, I would like to propose a closer examination of what a geography education should encompass. Should we only teach things that are relevant to us in Singapore, assuming that students will be more motivated to learn as a result of this? Some question the necessity of teaching physical geography in urban Singapore but I would like to counter that by putting forth the purpose of education. If the purpose of education is just a means to an end, which is to ensure that our students will have good results and good jobs when they graduate, then perhaps physical geography is not "necessary". But we know that education should encompass greater humanistic goals than that, and with rising global concerns such as climate change, we should expose our students to a geography that integrates deep physical

geographic understanding with wider social considerations, so that they can learn and grow to be concerned, informed individuals who can make a difference in the future.

Bibliography

Curriculum Planning and Development Division. (2013). *2236 Ordinary Level Geography Syllabus*. Ministry of Education (Singapore).

Educational Broadcasting Corporation. (2004). *Workshop: Constructivism as a Paradigm for Teaching and Learning*. Retrieved from http://www.thirteen.org/edonline/concept2class/constructivism/index_sub5.html

Geographical Association. (2014). Curriculum Making. Retrieved from <http://www.geography.org.uk/cpdevents/curriculum/curriculummaking/>

Hawley, D. (2013). What is the rightful place of physical geography. In D.Lambert & M. Jones (Eds). *Debates in Geography Education*. London:Routledge.

Lambert, D., & Morgan, J. (2010). *Teaching Geography 11-18. A Conceptual Approach*. Open University Press.

Pidwirny, M., & Jones, S. (1999-2014). *Physical Geography.net*. Retrieved from <http://www.physicalgeography.net/fundamentals/6i.html>

The Physics Classroom. (1996-2015). The Law of Reflection. Retrieved from <http://www.physicsclassroom.com/class/refln/Lesson-1/The-Law-of-Reflection>