

MA Geography Education 2015-16

How can a curriculum artefact be used to give students and teachers a holistic view of a syllabus?

[and thus a way of understanding and producing a Geography that both adheres to the demands of the examination syllabus and the values of teachers?]

By

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Abstract

This report argues that a well-chosen curriculum artifact can be used not only to illustrate and illuminate a particular section in a programme of learning, but also to give students a 'road map' of what they are to study. If successful, this will allow them to maintain a perspective on their learning throughout the course of a complex syllabus with a wide range of learning outcomes. For this to be successful, the artifact must initially fulfill the requirements for any useful curriculum artifact, and criteria for this are outlined. It will be argued that this also allows teacher to gain a greater degree of control of the curriculum making process and can inspire him/her to gain inspiration for teaching ideas and greater pedagogical control.

The report goes on to argue that an artifact can inspire teachers and help them to gain greater control of the curriculum, inspiring them to argue for changes in imposed syllabuses and curriculums that benefit curriculum design as well as pedagogy, using the example of the IBDP Environmental Systems and Societies course.

Introduction

The curriculum artifact I have chosen is an infographic called “Our Planet from Top to Bottom” (Tate, 2010 <http://tinyurl.com/gwap4ug>.) My intention is to use this artifact in a number of ways. Firstly I will attempt to define a curriculum artifact and to distinguish it from a “starter” or an illustration. Secondly, I will explore whether a curriculum artifact can be used to illustrate a whole syllabus (rather than a topic or a unit of work) in way that make it comprehensible to students. Thirdly, I will examine the extent to which such an artifact can be used by students and teachers as a way of turning an exam syllabus in to a curriculum: in curriculum *making* to use the Geography Association’s taxonomy (Geography Association, 2014)

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What Defines a Good Curriculum Artifact?

In more developed economies, teachers have access to an almost unlimited range of sources to illustrate, challenge and inspire students. With a connected computer almost any ‘object’ - image, song, movie clip, cartoon – again, the list goes on and on – can be called up in seconds. Outside the classroom, students live in a world where this is also a commonplace. To find a photograph of, say, Mount St. Helens erupting is trivial and one might appear in any Geography textbook. But why use a photograph when YouTube can show footage of the actual eruption taking place? Satellite imagery is displayed when one checks the weather on ones phone. But

¹ The spelling of this word seems contentious. From this point on Martin has used artifact, not artefact.

curriculum artifact must be more than simply an arresting image, a 'starter' or an illustration. This is not to say that such things are not useful pedagogical tools – to be sure, a good artifact will be engaging, illustrative, and possibly surprising - but to assert that something more is needed for an object to become a curriculum artifact.

Firstly, to be a curriculum artifact, the image (in the case of my example) must be carefully chosen as part of the curriculum making or curriculum planning process. It must be integrated in to the overall scheme of work and learning outcomes in a well thought out manner designed to increase depth of understanding or to portray a concept in a new light.

Following on from this, a curriculum artifact must “have legs”; that is it must be something that can be referred back to over a long period of time - in this case over the whole of an iGCSE course. If successful, this referencing will not just be done by the teacher but will be adopted by students as an instinctive tool that improves their understanding and aids clarification when the demands of a syllabus or scheme of work threaten cloud understanding in complexity, detail, or a multiplicity of topics. In short, it can help students to maintain an image of the wood when the trees threaten to crowd in.

A good artifact will also provide a different perspective. The example of a the song (Geography Association, 2012) given in the course readings for this module can help

students to view migration in a new way and remind students of the human stories of migration, and perhaps generate human understanding and empathy.

In addition, such perspectives can lead students to develop interdisciplinary links in class and teacher to develop these at the curriculum planning stage. The song might, for example, prompt a Geography department to work with an English department: could, Auden's "Refugee Blues" (Auden, cited in Medelson, 2007) or a similarly themed poem be covered at the same time as the unit on migration? The result could encourage students (and teachers) to employ a broader range of thinking skills when addressing the topic, allowing it to be contextualized in a wider sense and approached with greater subtlety.

A good curriculum artifact should ideally contain something for all levels of ability in a class, keeping all students in the Zone of Proximal Development in Vygotsky's (1978) terms. All students should be able to see it as an illustration, a scaffold or an aid to understanding, and stronger ones use it as a launch pad to more difficult concepts, approaches and ways of thinking.

Clearly, it would be asking a lot for any individual artifact to meet all of these criteria. Equally clearly, the artifact *in itself* can do very little of this job. For an object to become a curriculum artifact it needs to be embedded in both pedagogy and the curriculum making process. In my own classroom experience, I have found

that examining whether an object helps to convey Powerful (Geographical) Knowledge is a good test of whether an object has 'made the jump' to artifact.

In addition, the artifact needs to 'hit home'; to resonate with students in a way that allows its impact to be long term. This is often the hardest thing to predict, and all teachers will be familiar with using a particular analogy or illustration or even a joke that students refer to orally or in writing because it has made an impact or helped to clarify a difficult concept.

The Environmental Management Syllabus

The Cambridge Environmental Management (EvM) syllabus (Cambridge, 2014 <http://tinyurl.com/z7zdr6c>) is a popular choice in my school with 11 students (a third of the cohort) choosing it as an option. It is widely viewed as the easiest of the Humanities subjects and so attracts a disproportionate number of weaker students keen to avoid History or Economics, as well as a number of keen Humanities students who opt to take it along with History or Economics, as well as keen scientists who see it as the most 'sciencey' of the Humanities options. Geography is not offered as an iGCSE option at my school. This means that EvM is our only avenue to inculcate geo-capabilities within the formal curriculum and that we do so to classes of mixed ability.

The aims of the syllabus are for students to acquire:

1. knowledge of the functioning of the natural system which makes life possible on Earth
2. an understanding that humankind is part of this system and depends on it
3. an appreciation of the diverse influences of human activity on the natural system
4. an awareness of the need for management and human responsibility to keep the system in a healthy condition if life as we know it is to continue
5. an understanding of sustainable development and management to meet the needs of the present, without compromising the ability of future generations to meet their own needs
6. an understanding of how local environments contribute to the global environment
7. a sensitivity to, and a sense of responsibility and concern for, the welfare of the environment and all other life forms which share this planet
8. an awareness of their own values concerning environmental issues
9. an awareness of the values of others
10. a willingness to review their own attitudes in the light of new knowledge and experiences
11. a sound basis for further study, personal development and participation in local and global environmental concerns.

(Cambridge 2014, p. 9) and has sustainable development at its centre (p. 11).

The study of the Earth is broken down in to 4 *spheres*; Lithosphere, Hydrosphere, Atmosphere, and Biosphere (p. 12) with each of the spheres being studied in the following way:

- | | |
|------------------------|---|
| 1. Resources: | How does the natural system work? |
| 2. Development: | How do people use natural resources? |
| 3. Impact: | How does development change the environment? |
| 4. Management: | How can the environment be developed sustainably? |

(p. 12)

Table 1: Cambridge iGCSE Environmental Management Syllabus Matrix
(Cambridge 2014)

	Resources	Development	Impact	Management
Lithosphere	The lithosphere: structure and processes	Human activity and the lithosphere	Lithosphere in crisis	Action on the lithosphere
Hydrosphere	The water cycle The oceans	Human intervention in the water cycle Exploitation of the oceans	Water hazards The oceans at risk	Clean, safe, water strategies Managing the oceans
Atmosphere	The atmospheric system	Human activity and the atmosphere	Atmosphere in crisis Agriculture development consequences	Action on the atmosphere Managing agriculture
Biosphere	The ecosystem Elements of vegetation Elements of soil	The changing role of people in the environment Population growth Modification of vegetation and soils	Ecosystems at risk People in crisis Land at risk Agriculture: development consequences	Conservation of the ecosystem Population management Managing the land Managing agriculture

Assessment is by a three paper examination (my school has opted for the paper 4 Alternative to Coursework- coursework being an option that forms Paper 3) over a total of 4hrs and 45 minutes. Clearly, this course covers a wide range of content and the exam board provides a good deal of strict guidance about how this is to be

approached. The curriculum *planning* and *development* has largely been done for the teachers and it could be argued that a good deal of the curriculum *making* is also outlined in the syllabus. It is also worth noting that the exam can cover a very wide range of topics within the syllabus (see Appendix 1 for an example of a past paper).

Curriculum Making and the Use of Artifacts

My chosen artifact and its uses

My chosen artifact, “Our Planet from Top to Bottom” is an infographic showing the planet from the depths of the Marianas Trench to the edge of space. It is illustrated with various natural and man-made points (for example the wreck of the *Titanic*, the highest point that birds fly, the altitude ‘death zone’ for humans etc.). It is intended to benefit both students and teachers in the following ways:

(A) For the student

- (i) As a way to quickly illustrate the scope of the syllabus.

We are required to send students an electronic copy of the syllabus which is, of course, written primarily for teachers and in this case runs to 30 pages.

- (ii) To illustrate and make more comprehensible the concept of spheres.

A perhaps more obvious way to do this would be simply to state that we are starting from the centre of the earth and working outwards, but in practice many students

have a problem with the abstract concept of dividing the planet in to spheres, a concept at the very heart of the syllabus. The artifact is used as a way of making this concept more comprehensible to students.

(iii) To provide a “safe home”.

This syllabus is very wide-ranging in terms of the content that has to be covered and it is easy for students to lose an overall picture of what is being studied as they jump from, say, the impacts of mines on communities to the composition of gases in the atmosphere. The infographic is a handy and easy to understand ‘map’ to help students find out where they are and the relationship between apparently diverse topics. This is particularly useful in non-traditional subject that may not fit with students’ expectations about what a school subject should be.

(iii) To scaffold and to enhance with different learners.

In addition to illustrating spheres so that less able students gain a picture of what they will be studying for the next two years and how this is being organized, it can also be used to stretch stronger students and to challenge them with other new concepts. For example the splitting of the earth in to spheres can be used to illustrate idea of taxonomy and the sometimes arbitrary nature of such schemes. For able and less able students, the artifact can allow them...

(iv) ... to challenge the syllabus.

For example, it quickly becomes clear from the artifact that the Biosphere overlaps other spheres. Not only does this encourage questioning about how the course is arranged but brings up the vital notion of interdependence and interaction between the spheres. Also, students might question whether the list of spheres is exhaustive, and I have used the BBC series “Life in the Freezer” (Attenborough, 1993) to illustrate the cryosphere, something not mentioned on the syllabus.

(v) To make cross-disciplinary links

For example, between the idea of a human altitude ‘death zone’ (Biology/respiration) or ocean depths and pressure (Physics/gas laws)

(vi) To question the artifact itself. What parts of the syllabus does it *fail* to convey? Two obvious areas are the Lithosphere (less able students will usually be able to get this very quickly) and the concepts of exploitation and management of resources. When students have been able to come up with these, I will use another infographic, “Mining for Oil and Ore” (<http://tinyurl.com/zsgpwlp>) which employs a similar ‘top-to-bottom’ scheme. This would likely be the first example of another use of the artifact, namely as something...

(vi) ... to be added to by students.

When it is made in to a large print out for the classroom wall, students can add work to it, augment it with other resources, and use it to plot ‘where’ we are in the syllabus. This is another illustration of the point made above about an artifact

having longevity as one of the attributes that differentiates it from a resource or object.

(B) For the teacher/curriculum maker

Many of the benefits from using the artifact from the point of view of the student will also apply to teachers. For example, it may provoke thoughts about inter-disciplinary links, or ways of scaffolding topics and assignments to accommodate a range of abilities. It may also assist with planning, sequencing, and time management, particularly if more than one teacher is teaching the course to a particular class. In my school, for example, the split is between Year 10 (taught by a Biologist) and Year 11.

I would further argue that an artifact such as this could help teachers as curriculum *makers* move from a syllabus to a made curriculum. For example “illustrating and making more comprehensible the concept of spheres” (Student (ii) – above) illustrates the need to differentiate between a syllabus (spheres) and a curriculum/pedagogy: how do we interpret a syllabus, run with it, *teach* it? As Lambert and Morgan (2010, p. 49) put it,

“...we can be sure that the curriculum as experienced by children and young people in the classroom is, at least in part, the one that has been made by teachers. Teachers are the curriculum-makers”.

And while Rawling (2008, p.116) points out that the curriculum making process need not be made obvious to the student, I would argue that this might not be inappropriate here, showing students how an artifact can be used to, “deepen [their] knowledge and broaden their understanding ... gradually reach[ing] awareness and gain[ing] understanding of the big ideas or concepts”. Biddulph, Lambert and Balderstone (2000) link this process to the use of curriculum artifacts, pointing out that they,

“...represent an alternative way to [think] about preparing sequences of lessons. Rather than starting with the topics and the aims, we start with an artifact of some description” (p. 67)

In other words, the artifact rather than the syllabus becomes the starting point for the thinking of teachers as well as students. I would submit that this comes in the curriculum planning and – in particular – curriculum *making*- stages using the GA’s terms for the curriculum process.

The G.A.’s curriculum glossary distinguishes between curriculum design, development, and making. While there will be some overlap between these, the model might look something like the following in terms of a national examination syllabus or national subject curriculum:

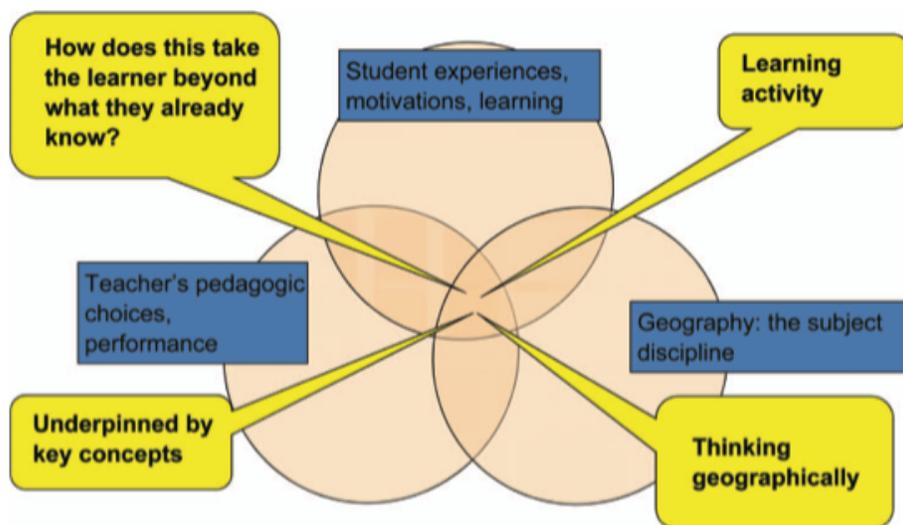
Table 2: Curriculum process (adapted from Geography Association Curriculum Making Glossary, GA 2014)

GA Nomenclature	GA Definition	Conducted by...	Degree of individual teacher control
Curriculum Development	An umbrella term that can encompass design (national specifications or programme of study), planning	Government (if National Curriculum) School (choice of exam subjects to offer, the exam board.	Zero to low
Curriculum Planning	The process that results in a scheme of work. It involves taking account of various factors and influences, including the needs and interest of the young people, developments in the subject and wider policy and society concerns such as citizenship, diversity education and community cohesion	School and Department	Low to medium
Curriculum Making	The creative process that 'puts the plan into action' (although this is not necessarily a simple, linear process). <i>All</i> teachers apply curriculum making skills, whilst planning may be led by a designated individual such as the head of department or geography leader). Curriculum making is concerned with balancing pupil needs with content selection and pedagogic	Subject team/individual teacher	Relatively high, but arguably being diminished.

	strategy. It is concerned with and 'making geography happen'.		
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Lambert and Morgan emphasize how these stages overlap in the diagram below:

Figure 1: Lambert's scheme showing interrelated aspects of curriculum making (2010, p. 50)



Yet this diagram implies a much greater degree of choice and discretion for the teacher than is experienced by those of us given an iGCSE examination syllabus to teach. In Shiro's (2013) terms, the "scholar academic" mode will be to the fore because of the externally imposed syllabus and externally assessed examinations. These latter will be used to assess the performance of the teacher as well as the students.

However, in helping teachers to think about a syllabus and how to teach it, a curriculum artifact can help them regain some control of the curriculum making and planning process that they might otherwise see as having been taken from them. The removal of this control has been an on-going process lasting many years with equally many twists and turns, as outlined by Rawling (2001) and Walford (2001). In what he calls the “cultural restorationist” view (one given further strength under Michael Gove): “school-based curriculum development [does] not feature in this vision” (p. 35). The teacher in the classroom may thus feel herself consigned to the role of curriculum deliverer. This may be especially true if the demands of ‘box-ticking’ and other command and control measures mean that a teacher may not have the *time* to make a curriculum from a syllabus even if she felt empowered to do so.

Roberts (1995) points out, however, that teachers are not always quite so supine. Her study examines the reactions of teachers in three schools with differing philosophies of Geography education, curriculum and pedagogy (what Roberts calls content-rich, framework, and process) and their reactions to the imposition of the UK National Curriculum. In each of the schools, the first reaction to the new designed and mandated curriculum was to ask how well it fitted with what the teachers saw as the needs of their students and their views of what made for good Geography education. Where there was a conflict,

“the heads of department want to preserve their way of curriculum planning, they want to continue enjoying teaching and they want to keep within the law, as far as they can. There is a process of adjustment, but the influence of the previous values seems dominant”. (p. 201)

In other words, when faced with an imposed curriculum or syllabus, teachers tend to wonder how they can take control of it. I would argue the use of curriculum artifacts can be one tool helping them to do this. To explain, I will compare some of my responses to the EvM syllabus with the reaction of some of the teachers in Roberts’ study when faced with the National curriculum.

EvM and the National Curriculum

In both cases, curriculum development and most curriculum planning have been taken out of the hands of the teachers and they will quick to focus on what is considered poor or lacking in terms of content and methodology. In my own case with EvM, I see a clear lack of Geo-capabilites (mapping and scale, for example) and focus on Environment to the detriment of Space and Place. In Roberts’ study, a teacher comments on the,

“enormous overloading and I have a very great concern that we will actually cover all the content. I still feel that they don't trust the professional judgement of teachers to choose case study examples. I can't understand why in the developing world you have to do Nigeria when you can't do Ghana.” (p. 198)

We are both, as Roberts has it, equating curriculum (syllabus in my case) with content, or looking at the framework (the spheres in my case) as defining the curriculum.

In the case of the teaching the developing world (in the quote above) I would argue that a curriculum artifact might help teachers improve curriculum making in the context of the set curriculum, and to adapt their pedagogy to incorporate external demands with their and their department's views on what Geography education should look like. For example a video, picture, infographic, or object might lead to a professional discussion about what the teachers would like students to learn about sub-Saharan Africa. What skills can be used, what geo-capabilities promoted, what knowledge, insights and understanding are they hoping to convey? Not only might this make the choice of country seem less important, it might inspire teachers to bring in work contrasting countries (Ghana and Nigeria, say) in order to avoid giving students the impression that an undifferentiated 'Global South' exists. In my own teaching, for example, I have used an image of the CBD of Lagos (Bappah, 2015) and asked students to guess the location. Africa is rarely offered as an answer. This image could be 'worked up' in to an artifact that allows the teachers to follow the National curriculum and prepare students for assessment while giving increased curriculum making power to the teacher.

In the case of my EvM syllabus, the infographic allows me to see ways of integrating more spatial concepts and Human Geography (the highest cities, the effect of the BP oil spill – both of which are on the infographic) in to the curriculum. Where can I get in some map work? How can I use Hong Kong and China as examples? More

generally, how can I see the syllabus as a starting point rather than an ending; how can I make a syllabus into a curriculum?

To be sure, not all curriculum artifacts are intended to apply to all of a syllabus or national curriculum (nor should they be) and finding and planning to use curriculum artifacts is only one part of curriculum making. Equally, an artifact cannot make the external constraints (the law of the land or the final exam) disappear. However, it is my contention that well chosen and skillfully employed artifacts can empower teachers as well as students to work with a fuller, more rounded curriculum that is better fitted to the educational philosophy of the school, the views of the teacher, and the needs of the students. It may also force teachers to answer the question posed by Lambert and Morgan (2010): “What kind of geographer are you?” (p. 163). This question is particularly pertinent when schools and teachers can feel themselves to be tossed around in shifting ideological winds of increasing intensity. Rawlings (2001) ends his historical survey of these shifting ideologies with a quote from Education Guardian:

“In modern times we have been plagued with a succession of short-lived ideologies in education ... like marchers towards a new dawn, and no one has the slightest idea that it will turn out to be an ugly morning ... But one cannot simply ditch all forms of ideology and assume that the system will continue to work equally well. These ideology sustained teachers, helped them to get out of bed in the morning, to work with a sense of purpose and go cheerfully in to school...”
(Ormell in Education Guardian, March 1992 quoted in Rawlings, 2001)

This echoes the sentiments expressed by the teachers in Roberts' study with schools concluding that, we have to 'get on with' but we will try to do so in ways that reflect our beliefs about what constitutes good educational and pedagogical practice and which answers the needs of our students. Curriculum artifacts can be a tool helping teachers to accomplish this but, again, this requires time and freedom. Increasingly prescriptive curriculums and syllabuses imposed from above (especially when coupled with onerous bureaucracy and more examinations) can take this away. A cynic might argue that this is the intention. One of the schools in Roberts' study faced with this latest iteration of ideology and curriculum design from on high more or less threw in the towel. A series of textbooks were "used in almost every lesson" and the author was praised for having, "done his work in making sure that it fits all the standards of attainment and so on. He's done it all and there's a checklist." (p. 200) This reminded me of the old sales pitch from IBM to purchasing managers claiming triumphantly that, "nobody ever got fired for buying IBM". It is true and depressing in equal measure, a call to abandon risky innovation and sensitivity to individual needs in favour of buying in a safe, one-size-fits-all, ready-made package that can be 'delivered' easily and then unplugged when technology/ideological fashion changes. Textbook publishers (and computer firms) will be ready with another packaged "solution" (no doubt including a "checklist") when this inevitably happens.

That teachers at the chalkface get evidence of the efficacy of these "short-lived ideologies" on student learning is usually ignored, so the temptation to buy the

textbook package and become a curriculum deliverer is strong. But as I have suggested, the use of curriculum artifacts can help teachers find ways of thinking that allow them to regain control over the curriculum making process, even when curriculum development and (increasingly) planning, are decided on high.

Standing In the Way of Control – the case of IB Environmental Systems & Societies and teacher feedback influencing centralized curriculum design.

To go further, it is possible that the type of thinking on the part of teachers that curriculum making with artifacts can engender and influence curriculum design.

The IB diploma programme forced students to choose one subject from each of six subject groups including Science (Group 4) and Individuals and Societies (Group 3).

This model of the six groups formed the core of the designed IB curriculum as shown by the IB Circle (it was a originally a hexagon) below.

Figure 2: The IB Diploma Programme Model



Source: IBO Logos and Programme Models (n.d.)

One result of this which teachers fed back in large numbers was that students with a bias to Humanities or Science subjects were taking making particular choices for their 'sixth subject' – the one they least wished to do but were forced into by the curriculum design. Scientists chose Standard Level Economics in Group 4, seeing it as the most 'Science-y' Humanity, while Humanities and Arts-inclined students picked Standard Level Biology in Group 4 as being the least 'science-y'/most Humanities or 'Arts-y' of the Sciences. Teachers pointed out for example, that if one were to pick a Science subject as the last to be formally studied by a 17-year-old, Standard Level Biology would not be that subject. A similar case could be made against an aspiring scientist ending her Humanities education with Standard level Economics.

Partly as a result of this feedback from teachers, the IBO responded in two ways. One was to introduce Environmental Systems and Society (IBO, n.d., <http://tinyurl.com/hmmzjfk>) which was specifically designed to make students' last experience with these subject areas more appropriate and meaningful. More radically from the IB's point of view, they made the subject cross-disciplinary, so that scientists could take it in Group 3 as their Humanity and Humanities and Arts students could take it in Group 4 as their science subject. This represented a huge change in the IB's curriculum design.

I would not, of course, claim this change as a victory for the use of curriculum artifacts. I would, however, suggest that it in part resulted from the type of thinking and curriculum making that the use of curriculum artifacts can provoke.

Conclusion

Most curriculum artifacts are constructed to be applicable to a subset of a programme and to allow students to approach a topic from a different and unfamiliar angle and to enhance learning by challenging pre-conceptions, showing wider relevance, and hinting at cross-disciplinary links. I have argued that a curriculum artifact can go beyond this in a number of ways.

Firstly, an artifact can be used to provide an overview of a course or syllabus. As such it can help students to contextualize individual units of study, show the

connections between them, and provide a safe “home port” when a large syllabus seems overwhelming.

Secondly, it can help teachers in the planning process. By giving students and teachers a shared overview the artifact can be a valuable aid to curriculum planning, and this is perhaps a more typical use. However, an artifact with a wider scope such as the one referred to in this report can also be a tool for curriculum *planning*. As such, it is capable of returning to teachers some of the power and autonomy that they have lost in the face of increasingly prescriptive syllabuses and national curriculums. An artifact can lead to professional discussions and collaboration among teachers and departments that allow them to make curriculums that reflect the needs of their students in place and time.

Thirdly, this freedom can move beyond subject areas, as a curriculum artifact that attempts to provide an overview of learning and learning outcomes can facilitate cross-disciplinary and departmental links. This can, in turn, lead to a school’s overall curriculum becoming more relevant and appropriate to students and to be more controlled by teachers. This can even take the form of feedback from schools resulting in curriculum-setting bodies such as the IB making changes to syllabuses and even programme structures.

More generally, I would argue that the process of selecting and integrating a curriculum artifact can help teachers to answer the question, “What kind of

Geographer are you?" It calls for a thoughtful evaluation of the syllabus and learning outcomes, as well as the type of pedagogy that will be adopted. This can help teachers, departments and (through interdisciplinary linking) schools *make* a curriculum that reflects their values while conforming to the needs of external syllabus and curriculum designers.

Appendix

1) Links to Syllabus, Past Papers and Mark Schemes for Cambridge Environmental Management (0680)

Syllabus

<http://www.cie.org.uk/images/128370-2015-syllabus.pdf>

Paper 1

<http://www.cie.org.uk/images/196687-november-2013-question-paper-11.pdf>

Paper 2

<http://www.cie.org.uk/images/196493-november-2013-question-paper-22.pdf>

Paper 4 (alternative to coursework)

<http://www.cie.org.uk/images/196689-november-2013-question-paper-41.pdf>

Mark scheme Paper 1

<http://www.cie.org.uk/images/185795-november-2013-mark-scheme-11.pdf>

Mark scheme Paper 2

<http://www.cie.org.uk/images/185787-november-2013-mark-scheme-22.pdf>

Mark scheme Paper 4

<http://www.cie.org.uk/images/185797-november-2013-mark-scheme-41.pdf>

2) IB Environmental Systems and Societies Subject Brief

http://www.ibo.org/globalassets/publications/recognition/4_envirsysssl.pdf

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