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Modularity and Interdisciplinarity: Confucian Insight for STEM-Related Disciplines

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Abstract

The modularity of the education system is generally geared toward a career-specific path for individual students. While varied subject choices and extracurricular activities can provide students with a rich range of experience, increased specialisation can create a sense of separateness between disciplines which may result in the neglect of engagement between fields which are otherwise mutually informative and insightful. A greater openness to interdisciplinarity would have the benefit of exposing specialists to fresh ways of viewing familiar subjects with a further potential to inform and inspire new and mutually beneficial pathways of education and learning.

I illustrate the potential of an interdisciplinary approach in the context of the climate crisis. STEM-related disciplines can draw practical insight from compatible and well-founded philosophical principles e.g. Confucian leadership principles which warn against overconsumption, encouraging the kind of environmental awareness which could avert or mitigate the environmental and societal impact of climate change.

Modularity and Interdisciplinarity: Confucian Insight for STEM-Related Disciplines

This paper contains two main sections. In the first I present definitions of categorisation and interdependence, and illustrate their application to my argument. In the second section I outline the modularity of the education system, offer an explanation of the drawbacks of such modularity insofar as it encourages the marginalisation of subjects which otherwise demonstrate the interdependent nature of all learning, and finally attempt to exemplify this by applying Confucian principles to the current environmental crisis.

Categorisation and Interdependence

It is of practical necessity as well as pedagogical practice that modern education systems are modularised into their various disciplines and subjects. Specialisation tends to increase as a student moves through primary, secondary, and third level education, with an

increasing emphasis placed on employability throughout. Specialisation is therefore a crucial part of development for both teachers and students as they progress through the education system. Expertise is of course important for the development and transmission of knowledge, but does it sometimes coincide with the dismissal of subtly - but importantly – related disciplines?

For the following argument I rely on two concepts: categorical thinking, and interdependence. I use the term 'category' as defined by philosophers Douglas Hofstadter and Emmanuel Sander: "A category is a mental structure that is created over time and that evolves, sometimes slowly and sometimes quickly, and that contains information in an organised form, allowing access to it under suitable conditions." (Hofstadter and Sander 2013, 14). For my purposes 'categorical thinking' is any formal or informal thinking which relies on the implicit or explicit assertion of categories (e.g. the informal thought that one's mother is a part of the category 'my family', as opposed to another family, or the formal thought that the understanding of the digestive process is part of the category of 'biological science')[†].

I use the term 'interdependence' in its broadest Buddhist interpretation as the notion that all phenomena are originally dependent and therefore no two phenomena can be considered as entirely separate; all phenomena (including in this case intellectual disciplines) are in some way interdependent.

The relevance of these two terms to my following argument is thus: if students are taught via a modular education system, then information is necessarily presented as bound by more or less strict categories. The reinforcing of this categorical thinking then leads the student to treat certain subjects as inherently separate from – rather than interdependent with - others, thereby blinding them to potentially important insights and perspectives.

Modularity, Education, and Interdisciplinary Insight

The National Council for Curriculum and Assessment outlines the curricula for Early Childhood, Primary, and Secondary education in Ireland. The modularity and employment driven nature of the current curriculum (albeit one which is under regular review) is

[†] It should be noted that on this view categorical thinking also applies to examination grading and the attendant effects on the self-worth of a student. For practical purposes at third level a mark of sixty-nine may count as second class honours while a mark of seventy-one may count as a first class honours. Even with such a marginal difference and the potential arbitrary contexts in which such a difference in mark could occur, it is possible that a student asserts their 'first class' or 'second class' status in affirming these categories, rather than viewing them as general indicators of intelligence/aptitude/application.

referenced on the NCCA's dedicated website: "The Leaving Certificate (Established) is a twoyear programme that aims to provide learners with a broad, balanced education while also offering them a chance to specialise towards particular higher education and career options."

Categories of specialist subjects are nested within categories of subject groups:

language; science; business studies; applied science; social studies. A concern here is that the categorisation of subjects in this way, while entirely pragmatic, may discourage the healthy view that certain specialist subjects are interdependent with those of other subject groups.

Religious education falls within the subject group of social studies. Biology falls within the subject group of science. The former then, is categorised separately from the latter in both the official curriculum and likely in the view of the students who are studying them. There are, however, historical and philosophical instances of mutual insight between traditions which are now categorised as 'religion' and subjects which may be considered most appropriately categorised as 'science'.

Of relevance in this regard is the application of Confucian ethical principles to the current environmental crisis. There is a demonstrable history of scientific and technological advancement ignoring the lessons of certain Confucian principles to the detriment of the local and global ecosystem. One need not ascribe to Confucianism in order to apply the principles therein to practical approaches to environmental impact.

Confucianism proposes that non-action and non-intervention is often a wise strategy

(which may be anathema to a post-industrial, capitalist society). This is exemplified in the 'Mandate of Heaven' a concept relevant to political leadership; a good leader orders human action in accordance with natural processes. How might this apply to attitudes toward environmental concerns?

The Mandate of Heaven was held by rulers who understood that natural resources are to be preserved in order to ensure the continued flourishing of both the things of nature, and the human part of the ecosystem which relies on those resources.

> "[Documentation from] when Confucius was a young man, records a high government minister expressing concern about possible ill effects on agricultural land of deforestation and draining of marshes. Such passages demonstrate an awareness stretching back three thousand years of the nature of ecological interactions and the need to restrain human interventions in them. However, as new developments in technology gradually granted people greater power over the natural world, under pressure from a growing population they continued to intensify their impact on the land." (Parkes 2018, 71)

The overcultivation of agricultural land leads to low crop yields, drought, and other detrimental impacts. A good ruler ensures the safety and integrity of the ecosystem and its resources as a matter of policy. The mass deforestation of China's Loess Plateau is a stark example of the non-implementation of Confucian insights in the face of unchecked technological advancement. For the contemporary environmental scientist then, Confucianism presents the historically-grounded perspective that human interventions in nature – whether they be to exploit resources or to undo the damage caused by such exploitation – should be tempered mindfully, on the understanding that non-action is, in appropriate contexts, preferable to continued intervention.

However, the categorisations we form on the basis of language terms may have an influence on whether or not one adopts such perspectives. In the Confucian context 'Heaven' is not to be understood as a metaphysical, transcendental realm, but rather something like the totality of natural forces (wind, water, etc). Yet the use of such a term in the current education system may encourage one to categorise Confucianism as a religious subject, and therefore non-interdependent with any scientific discipline. 'Religion' as a term is now treated as fundamentally separate in character from the sciences. Therefore if someone entrenched in a scientific worldview sees the word 'religion' in an environmental context, they may avoid that particular source of information. But, as demonstrated above, there are philosophical traditions the principles of which often get presented in a religious context which are essentially grounded in scientifically compatible paradigms and which, furthermore, offer well-grounded insight wisdom to areas of contemporary concern.

Therefore to categorise Confucianism as 'religious' and in turn to categorise religious terminology as 'non-scientific' would lead to the to the dismissal of the interdependent nature of both subjects. It may be more palatable, and indeed perhaps more appropriate, to construe Confucianism (or complimentary traditions such as Daoism and Zen Buddhism) as philosophies or ethical codes, but this would merely be a semantic move and not one which changes the basic important insights which can be gained from such traditions.

In relation to the education system then, it may be of benefit to more readily present marginalised philosophical perspectives as ways of seeing (in much the same way as a new language offers the learner not just a new set of linguistic skills but a new perspective on history, culture, and tradition), rather than as fringe topics or extracurricular activities which are of no great import to the core curriculum. University College Cork have demonstrated moves in this direction with the development of the 'Connected Curriculum' academic

strategy[‡]. It is beyond the scope of this paper to discuss policy implementation but a brief suggestion would be: at secondary level, a reworking of non-core topics such as religion and Civil Social and Political Education to more fluidly and directly relate - and contribute - to core subjects and, at third level, the facilitation of interdisciplinary modules for credit as part of degree programmes (where, for example, a tradition such as Confucianism is taught with relevance to students of environmental science[§]).

If one were to construe the value of philosophical traditions such as Confucianism in terms of sheer employability, one would likely be left to pursue only a historical, philosophical or traditional religious course of work. But an interdisciplinary approach which encourages a more inclusive attitude to such traditions allows a new perspectival grounding which may offer valuable insight to students who will go on to use their expertise in, for example, the development of policy around sustainable environmental practices. In this way the encouragement of an understanding of interdependence in the curriculum could broaden the scope for learning at all levels of the education system.

[‡] "… students and staff will be facilitated to make meaningful connections within and between disciplines, by integrating on-campus and off-campus learning experiences and by engaging in research-based learning at all levels."

[§] This author experienced a one-off instance of this during UCC's University Wide Sustainability module in 2019 when Prof. Edmond Byrne, Professor and Chair of Process & Chemical Engineering, outlined the historical philosophical thinking which saw humankind as separate from their environment which in turn led to a lack of responsibility with regard to environmental impact. Having such a theme woven into a science degree may well breed a sense of history and responsibility which may be lost in a wholly technical-focused degree.

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