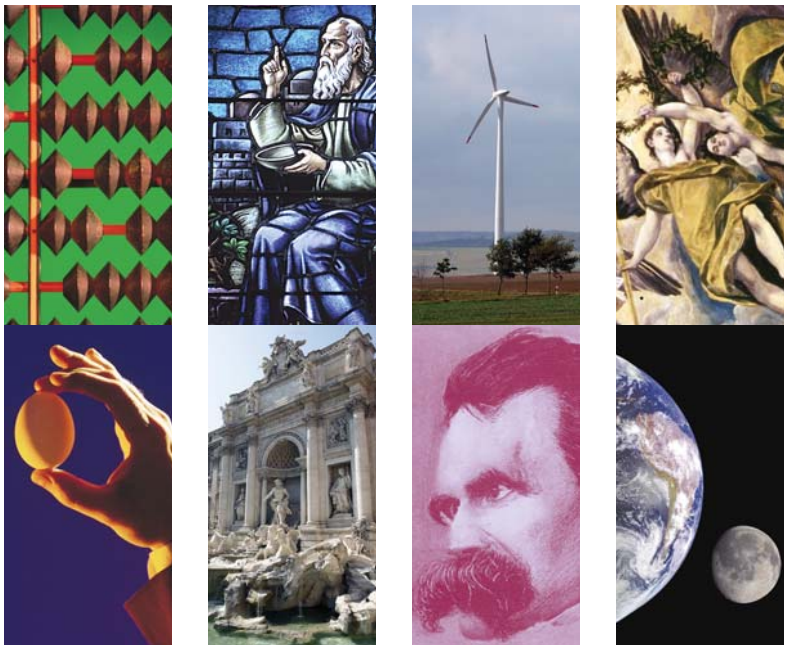
LINDA MEI

BRIDGING DISCIPLINARY BOUNDARIES



DURING THE RENAISSANCE, a learned man possessed proficient knowledge in many areas of integrated study. We now call such a person a 'Renaissance Man', and that type of pedagogy 'interdisciplinary'. Back then, a scholar studied everything – mathematics, music, astronomy, arts, philosophy, rhetoric, and more. It was considered the norm. Now, when I tell people about my degrees – a Bachelor of Science in Animal Biology and a Bachelor of Arts in English Literature – I usually witness a look of bewilderment, followed by a comment about my unconventional approach to education. Not a surprising reaction, given the modern focus on specialization.

The rapid advancement of technology and changes in the accessibility of education have led academic institutions to create 'disciplines' to meet the needs of a society in transition. However, society does not function in distinct categories, and the creation of separate disciplines discourages recognition of the unity of knowledge. Our emphasis on polarities – by treating the arts and the sciences as two separate entities for example – leads to limitated understanding and narrow-mindedness. According to John Beatty, Chair of the Interdisciplinary Studies Graduate Program at the University of British Columbia, "the world is not divided into disciplines," and "real world problems can't be solved without taking into account a number of different points of view."[1] To counter this tendency to separate academic study into distinct silos, interdisciplinary education promotes the unity of knowledge by bridging the cultural divide between the social constructs of disciplines and encourages the development of knowledge to enhance society.

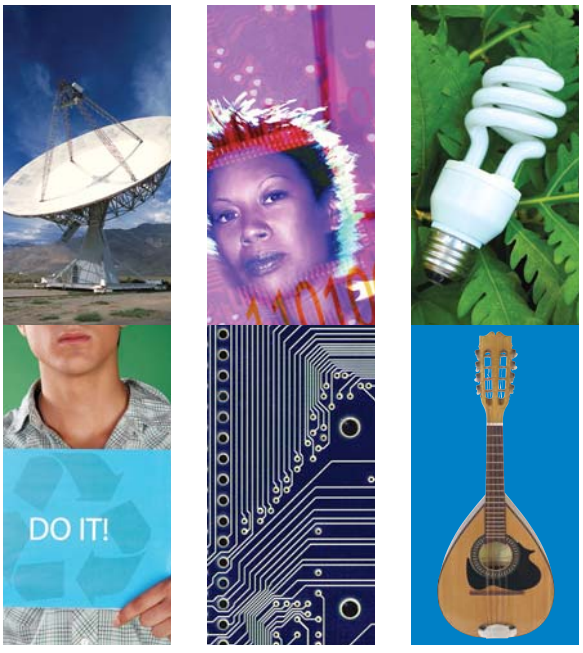
The term 'interdisciplinarity' is ambiguous, for the word itself is an abstraction that transcends limitations. According to Moti Nissani, a faculty member in the Department of Interdisciplinary Studies at Wayne State University, a "*discipline* can be conveniently defined as any comparatively self-contained and isolated domain of human experience which possesses its own community of experts," and therefore, "*interdisciplinarity* is best seen as bringing together distinctive components of two or more disciplines."[2] Marcia Jenneth Epstein, a professor at the University of Calgary, defines interdisciplinarity as a "process of integrating methods and information, which may be, derived from particular disciplines into a unified approach that is not limited by any particular canon."[3] Both definitions stress the complementary contributions to knowledge when various areas of research overlap.

IN DEFENSE OF A RENAISSANCE EDUCATION

Since society functions in an integrated manner and education serves as the foundation for that society, both students and academics need to realize the potential of interdisciplinary knowledge. Among education's many purposes, one of the most important is to develop perceptions and an awareness of the public sphere that gives students a greater agency for social change. In order to actively participate in civic and democratic practices, the leaders of tomorrow need to refer to a wide range of disciplines and perspectives that promotes interaction with others on a global and cross-cultural scale. David Orr, an educator and environmentalist, asserts that the issues we face today "cannot be solved by the same kind of education that helped create the problems."[4] For example, as one of the most prominent topics today, conservation ecology requires insight into science to demonstrate how anthropogenic activities and geological/biological influences interact to create a problem such as the enhanced greenhouse effect, as well as sensitivity towards political, social, moral and economic implications to allow for effective policy-making. In this situation, if one merely considers the science and neglects the ethics or vice versa, the consequences may be irreversible. Complex issues require complex approaches and perspectives.

As an inquiry-based and relevant approach that expands and advances knowledge, interdisciplinary education facilitates creativity and flexibility, shifts perspectives, and can often overcome the limitations of traditional approaches, especially when dealing with real world problems. Understanding complex problems requires a myriad of insights and ideologies from multiple disciplines, but specialists' focused viewpoints often deter them from considering other approaches or information from outside of their subject areas. In addition, they are often blind to the deficien-

EN BREF **Comme la société fonctionne de façon intégrée et que l'éducation lui sert de fondement, tant les étudiants que les chercheurs doivent réaliser le potentiel de connaissances interdisciplinaires. L'obstacle sans doute le plus courant à une approche intégrée réside dans la résistance innée au changement. Les services existants des établissements académiques tentent généralement de maintenir la structure et les méthodes en vigueur, puisqu'un système connu assure la stabilité. Cependant, la mondialisation et la complexité du monde réel obligent les élèves à détenir les compétences requises pour communiquer à travers les cultures scolaires ainsi qu'internationales. Ce n'est qu'en valorisant et en comprenant les savoirs de différents domaines, ainsi qu'en prenant conscience des interactions sociales et scientifiques contribuant aux problèmes qui nous confrontent qu'ils pourront résoudre ces problèmes.**



cies of their own culture. Academics and students wishing to invoke societal change may find that fragmentation and segregation of ideas and disciplines render them passive, restricting their abilities to actively pursue progress and the unity of knowledge.

In order to function efficiently, we need to communicate effectively. Integrating various areas of study improves communication among academics and within the academy, mobilizing the resources necessary to advance knowledge. By promoting contributions from all cultures, interdisciplinary education reflects the reality and the positive face of globalization. By keeping an open mind, including a variety of backgrounds, and considering both intellectual and social implications, we are more likely to promote positive change.

RESISTANCE TO CHANGE

Despite the benefits of interdisciplinary education, many academic institutions continue to resist an integrated approach. Often, the cause of such resistance lies in budget restrictions, since interdisciplinary education requires a wider arsenal of resources to function effectively. As Beatty points out, "all the different units of the university are competing with each other for one pot of funds, and...the traditional disciplines will often argue that people in interdisciplinary studies ... are undisciplined because they're not trained as deeply in any one discipline as students who get a Ph.D. in that one discipline." Those opposed to interdisciplinary studies further argue that most people lack the ability to master a myriad of subject areas. This 'naïve generalism', they claim, could potentially reduce the kind of

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research that requires specialized knowledge. According to Thomas C. Benson of the University of Maryland, "there is the claim that integrative studies faculty are, for the most part, second-class scholars, exiles and refugees from the disciplinary departments, where they either failed to measure up or found themselves incapable of sustaining the kind of rigor and focus required for success in disciplinary scholarship."[5] The criticism here is that superficial knowledge of multiple disciplines fails to provide students with the foundation that is necessary for further research.

Shifting to an interdisciplinary approach at the secondary school level faces somewhat different challenges. The current educational environment uses examinations as the primary method of evaluation, pressuring educators to emphasize success on exams and grade point averages rather than true understanding and engagement with the material. This emphasis reinforces the fragmentation of knowledge into distinct disciplines. The challenge, asserts Beatty, is to get "traditional disciplines to relax their curricula so that their students can not just learn about that particular area but learn about other areas as well."[6]

Perhaps the most prevalent impediment to an integrated approach is human nature's innate resistance to change. Established departments within the academic institution generally try to maintain the current structure and methodologies, since a familiar system provides them with stability. The departments separate themselves physically, and such physical segregation acts as a metaphor for the distinct differences in ideologies, perspectives, and approaches. As a student working on a dual degree, this metaphor becomes real as I find myself racing from one end of campus to the other, cramming a 15-minute walk into ten minutes of break because of the distance between Biology and English buildings.

While power struggles may be inevitable when different departments cooperate, resistance to such cooperation interferes with education's primary purpose – equipping students with real world problem-solving abilities.

INTERDISCIPLINARY EDUCATION IN ACTION

Currently, one of the most successful areas of interdisciplinary education is Science, Technology, Society and Environment (STSE) Education. Douglas Roberts from the University of Calgary identifies the following purposes of science education: to establish solid foundations, discover correct explanations, develop scientific skills, learn the structure of science, explain and make sense of natural phenomena, understand everyday objects and events, and gain an awareness of science in both a social and technological context.[7] Several of these objectives require an interdisciplinary approach because the isolated discipline of science cannot fully encompass such a range of philosophical methodologies. Across Canada, various secondary schools have incorporated this integrated approach into their science curricula in an attempt to emphasize the significance of economic, ethical, cultural, social, and political influences on scientific and technological advancements, and vice versa.

Recognizing the environment as a key scientific and educational issue, STSE education focuses on engaging students in the understanding and exploration of real-life issues that call for both social and scientific solutions, such as global warming, genetic engineering, environmental legislations and animal testing. This integrative approach avoids the tendency of science curricula to restrict education to textbook explanations of abstract theories and the occasional controlled laboratory or field experiment. Instead, it situates students within society and prepares them to make informed and ethical choices, contribute to the process of change, and participate as citizens of a democratic society.

Many of the issues we currently face as a society originate from the fields of science and technology. Hence, educators need to recognize the crucial relationship between the social or humanistic sciences and the technological sciences. George Richardson and David Blades from the University of Alberta's Department of Secondary Education argue that "locating citizenship entirely in the social studies risks 'freezing' it as a discrete, subject-bound concept" and that, in the traditional school system, "citizenship becomes just another notion to be acquired, tested and discarded rather than a living practice in which students actively engage social issues in civic society."[8]

This collaboration of the two fields addresses underlying values and interests while promoting alternative voices. Science teachers could benefit from the expertise and critical perspectives of a social studies teacher, while social studies teachers could examine humanistic issues in broader and more relevant contexts with contributions from science teachers. As a result, educators from both disciplines could deliver a curriculum that challenges and engages students to see real life applications. By situating citizenship within the context of the science that surrounds their everyday lives, we encourage students to use their knowledge in a more practical and unified way, and to take responsibility to create change.

ANSWERING THE "WHY?"

Interdisciplinary education, such as the STSE education program or the Interdisciplinary Studies Graduate Program at the University of British Columbia, answers one of students'

most common inquiries – why? Traditional subject categories often lead students to question the relevance of their studies; they realize that classroom knowledge and textbook learning apply little to the development of skills, establishment of foundations, and understanding of truths. Within the constraints of traditional disciplines, much of the 'knowledge' we acquire remains little more than abstract theories. In Biology classes, for example, we learn that the morphogen Shh inhibits the action of Class I transcription factors to suppress dorsalization of the neural tube, while simultaneously activating Class II transcription factors to induce ventral marker expression. In English literature classes, we discuss the fact that Alice Munro uses a moebius strip model in her prose 'Family Furnishings'. The transition point of this moebeius strip storytelling method is marked by the sentence "My father had to remind me of the story, published years ago, and I was surprised, even impatient and a little angry, to think of Alfrida's objecting to something that seemed now to have so little to do with her."[9] Both pieces of information are indeed, interesting; but other than describing that specific developmental pathway on Biology examinations, or discussing the significance of Munro's innovative approach for English essays, neither has much relevance to everyday life. This acquisition of isolated facts raises the question "Why am I learning this?" and does little to advance knowledge in a unified and applicable context.

Globalization and the complexities of the real world require students to possess the skills to communicate across academic, as well as international, cultures. Only by appreciating and understanding knowledge from various fields, and by recognizing the social and scientific interactions that contribute to the problems we face, will they be able to solve those problems. Interdisciplinary education has a long history. It's time to put it back into the mainstream.

Linda Mei is currently completing her B.Ed. in Secondary Education at the University of British Columbia. With her B.Sc. and B.A., Linda has the wonderful privilege of teaching very diverse subjects, and is currently attempting to incorporate interdisciplinary approaches and cross-curricular content in her classes. She has been known to teach poetry in Biology class and to wear a lab coat into English class.

Notes

1 John Beatty, interview by author, Vancouver, B.C., 26 February 2008.

2 Moti Nissani, "Ten Cheers for Interdisciplinarity: The Case for Interdisciplinary Knowledge and Research," *The Social Science Journal*, 34, no. 2 (1997): 201-216.

3 Marcia Jenneth Epstein, "Teaching a Humanistic Science: Reflections on Interdisciplinary Course Design at the Post-secondary Level," *Current Issues in Education* 7, no. 3 (2004). Accessed 14 January 2008 from http://cie.ed.asu.edu/volume7/number3/

4 David Orr, *Ecological Literacy: Education and the Transition to a Postmodern World* (New York: State University of New York Press, 1992), 83.

5 Thomas C. Benson, "Five Arguments against Interdisciplinary Studies," *Issues in Integrative Studies*, no. 1 (1982): 38-48.

6 Beatty.

7 Douglas Roberts, "Developing the Concept of 'Curriculum Emphases' in Science Education," *Science Education* 66, no. 2 (1982): 243-260.

8 George Richardson, and David Blades, "Social Studies and Science Education: Developing World Citizenship Through Interdisciplinary Partnerships," *Canadian Social Studies* 35, no. 3 (2001). Accessed 14 January 2009 from http://www.quasar.ualberta.ca/css/Css_35_3/ARDeveloping_world_citizenship.htm

9 Alice Munro, "Family Furnishings." In *Sexing the Maple*, eds. Richard Cavell and Peter Dickinson (Mississauga: Broadview Press, 2006), 3-25.