

One undergrad, two disciplines: Can a student master both arts and science?

As Singapore forges ahead with interdisciplinary education, its success will depend on how well three inherent tensions are reconciled

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For *The Straits Times*

Can a political science student learn chemistry? This was a question posed to 19-year-old Leow Shuen Ling, who began her undergraduate education at the National University of Singapore's (NUS) College of Humanities and Sciences (CHS) earlier this month.

Her response was an emphatic "Of course!" but this was followed by what she said would be a better question – why can't a political science student learn chemistry? To be fair, this question may not fully apply to Shuen Ling, as she intends to pursue a double degree in political science and chemistry. Nevertheless, the question is reasonable and might have crossed the minds of those who have followed the development of the CHS from its opening late last year.

The CHS brings together the NUS Faculty of Arts and Social Sciences and the Faculty of Science. Its opening is part of a series of moves to prepare students here for a world of wicked problems, ones like climate change, cyber security and pandemics which pay little heed to disciplinary boundaries.

With further announcements by NUS last week that two new interdisciplinary colleges will be established – bringing together the University Scholars Programme and Yale-NUS College, and separately, the Faculty of Engineering and the School of Design and Environment – Singapore has ushered in a bold new chapter in higher education.

Much has been said about the importance of interdisciplinary education, but beneath the big plans and abstract discussions, it is easy to forget that individual students are the heart of the matter: students like Shuen Ling, who have distinct hopes and worries, embarking on brave new journeys for a better future.

As Singapore accelerates its interdisciplinary drive in higher education, what needs to be

addressed are three tensions that students are likely to have to grapple with when they enter institutions like CHS.

TWO WORLDS, TWO VIEWS

The first challenge posed by efforts to integrate the arts and sciences has to do with the habits, skills and perspectives that the students bring with them from their earlier years in education.

In junior college, for instance, students are generally divided into the arts and science streams; most students take a "contrasting" subject from the stream they are not part of, but the streams themselves remain separate. Such divides, despite having some benefits, could never the less affect how far students engage with

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other disciplines.

Consider marine biologist Toh Tai Chong and sociologist Yasmin Y. Ortiga's experiences running an interdisciplinary reading group on green spaces. Writing in the *Asian Journal of the Scholarship of Teaching and Learning*, they recalled an instance of a life science major who had difficulty telling the difference between a survey and an interview and a history major who said she "did not believe in objectivity".

While most students will likely fall somewhere between these extremes, it remains reasonable to suggest that students generally view arts and sciences in silos, being used to an education system where the two are largely separated.

Furthermore, the very nature of these subjects when taught in isolation lends them to such perceptions too: The hard sciences focus on precision and impersonal, mathematical reasoning and laboratory experiments; the arts subjects centre on the human condition, emphasising interpretation and diverse perspectives which are sometimes gleaned through surveys and interviews.

To address this tension between the arts and sciences, students would benefit from a glimpse into history, and understanding how education has evolved along with advances in all fields of knowledge.

"The academic disciplines of today and the modern concept of disciplinary are largely the product of developments in the late 19th and early 20th centuries," Dr Allen F. Repko, former director of an interdisciplinary studies programme at a United States university, and his co-authors wrote in the book, *Introduction To Interdisciplinary Studies*.

Indeed, the creation of disciplines emerged as a necessary construct to marshal the growing mass of information and assist in deeper research, but the price is the creation of silos, which ironically makes it harder to advance knowledge by seeing connections.

Today, we have reached the stage where a correction is needed in the direction of Leonardo da Vinci, the archetypal Renaissance man, able to synthesise what both the arts and sciences have to offer. Yet in trying to achieve this correction, students may find themselves facing another tension – between breadth and depth of knowledge.

BREADTH AND DEPTH

For students entering interdisciplinary institutions, one concern would be whether depth of knowledge will be compromised.

On a basic level, assuming fixed teaching hours, it is inevitable that some depth will have to be traded off for greater breadth – but only because a better balance between the two is what will be needed for the future economy, due to the interdisciplinary nature of the problems that need solving.

Furthermore, with information now becoming outdated faster, the excessive specialisation seen in the past could even be counterproductive, taking time away from developing the agility to learn new knowledge.

Interdisciplinary institutions can also address students' concerns by giving them the flexibility to create their own balance between breadth and depth (within limits).

For instance, while all CHS students have to read an interdisciplinary common

curriculum comprising a third of their CHS education, they have some flexibility in customising the other two-thirds to embark on one of three pathways.

If they wish to focus on a particular subject, they could embark on the "deep specialist" pathway. Of course, like Shuen Ling, they could instead be an "integrator" and home in on two majors, or alternatively, read one major alongside a minor and unrestricted elective modules.

PASSION AND ABILITY

When asked if a political science student can learn chemistry, Shuen Ling replied that "ultimately, what we can learn is dependent on the extent of our passion and interests". But for some students, passion and ability to learn may in fact be another source of tension. What if they are passionate about a contrasting subject but are not sure how good they will be at it?

While there are differences in individuals' abilities, possible tensions between passion and ability can be partially reconciled with better learning strategies. This belief stems from our prior involvement in an NUS elective module, Learning To Learn Better, helping students set aside sub-optimal learning strategies and pick up better ones.

One powerful learning strategy is drawing connections, a skill which lies at the heart of interdisciplinary learning. For example, a political science student could learn about developments in chemistry by relating them to politics.

A quick Google search reveals helpful resources, such as an interesting periodic table designed by the European Chemical Society highlighting elements at risk of scarcity due to reasons such as conflict. Professor of history of science Agusti Nieto-Galan's book *The Politics Of Chemistry*, which analyses the intersection of science and power in 20th-century Spain, could also be an interesting read.

Institutions must also play their part in addressing the three aforementioned tensions. Besides giving students the flexibility to customise their interdisciplinary experience within limits, they should also ensure that educators are well-trained in appropriate pedagogies, and that sufficient support is given to students who may want to pursue a field in which they have less prior training.

Whether it be institutions, educators or students, in this new chapter of higher education in Singapore, success will depend on how all involved find the right balance in managing inherent tensions – between passion and ability, between breadth and depth, and, for CHS students like Shuen Ling, between the arts and the sciences.

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The National University of Singapore's College of Humanities and Sciences, which brings together its Faculty of Arts and Social Sciences and Faculty of Science, is part of a series of initiatives in higher education to prepare students here for a world of wicked problems, ones like climate change, cyber security and pandemics which pay little heed to disciplinary boundaries, say the writers. PHOTOS: NATIONAL UNIVERSITY OF SINGAPORE