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REFLECTIONS ON MODULE DESIGN & CRITICAL READING

When it comes to designing learner-centred courses and modules, there are a few key principles that most educators adhere to. According to Hodges (2012), these are encapsulated in the backwards course design model (Wiggins & McTighe, 1998), where "...course design begins by determining what it is that we really want students to be able to do or feel or think long after the final exam is over. Then we make every other aspect of the course serve those goals." (pp. 1).

In this issue, in what ways have our authors done this as they conceived and implemented their respective modules? For **Dr Maung Maung Saw** (Clinical Imaging Research Centre), it was about charting new learning frontiers in his discipline as he explored the feasibility of starting a new interdisciplinary module. (see pp. 2). Meanwhile, when it came to developing a module on Western architectural history for her mostly-Asian students, **Dr Lilian Chee** (Dept of Architecture) did so by grouping the topics according to themes rather than chronologically, and situating the content within a contemporary Singaporean context (pp. 7). Dr Chee shares her experiences and the challenges she faced. For **Ms Chen Hui-Chen** (Alice Lee Centre for Nursing Studies), she challenged her students to cultivate their self-directed learning skills when it came to mastering drug calculations, skills that will stand them in good stead when they graduate (see pp. 12). Meanwhile, to give Masters of Public Health students a more authentic learning experience, **Dr Agus Salim and A/P Gerald Koh** encouraged them to bring their own datasets for their practical sessions for the Biostatistics module under their charge (pp. 17). While it meant a time-consuming re-design of major portions of the module, the writers relate the positive payoff it had in terms of enhancing their students' learning and igniting their interest in pursuing the subject further.

We are pleased to also have in this issue colleagues sharing their experiences in cultivating their students' critical reading skills. **A/P Sunita Abraham** (Dept of English Language & Literature) outlines various strategies (including active listening incorporating paraphrase) which help students include a rhetoric of critical assent in their critical reading skills (see pp. 22). Meanwhile, for their assignments, **Dr Zhang Chun** (Dept of Physics) challenged his students to critique papers from top-tiered journals, with the aim of not only cultivating their critical thinking and evaluation skills, but also to imbue in them the courage to critically analyse the content of such papers rather than just absorbing the content without further contemplation.

References:

- Hodges, L.C. (2012). The three most time-efficient teaching practices. *Ntl Teaching & Learning Forum*, 21(5). pp 1-2. doi: 10.1002/ntlf.20004.
- Wiggins, G. & McTighe, J. (1998). *Understanding by Design*. Alexandria, VA: Association for Supervision & Curriculum Development. ■

Designing a New Interdisciplinary Module on Medicinal Radiopharmaceutical Chemistry: A Feasibility Study

Dr Maung Maung Saw

Clinical Imaging Research Centre, Yong Loo Lin School of Medicine

Increasing Importance of Interdisciplinary Education

Interdisciplinary education has become increasingly important in recent years as society faces increasingly complex challenges that do not fall within just one discipline. According to Holley (2009a), disciplinary concentration of faculty, student, and knowledge are no longer the *de facto* norm for institutions. In fact, more institutions are adopting the interdisciplinary approach in their teaching, which is characterised by flexibility, innovation and the creation of new constructs for dealing with complex issues (Stone, Bollard & Harbor, 2009). We need to distinguish this from the multidisciplinary approach to teaching: interdisciplinarity refers to an integrative process or relationship, while multidisciplinary refers to an additive process which combines separate disciplines in the pursuit of an overarching question or topic (Davis, 1995; Holley, 2009b). Similarly, Mansilla and Duraising (2008) define interdisciplinarity as an approach educators use “to integrate knowledge or modes of thinking in two or more disciplines or established areas of expertise to produce a cognitive advancement ... in ways that would have been impossible through [a] single disciplinary means”.

Medicinal Radiopharmaceutical Chemistry: A Solid Example of an Interdisciplinary Subject

Chemistry has diversified in many new directions and medicinal chemistry is one striking example which crosses a few disciplinary boundaries: organic chemistry, inorganic chemistry, pharmacy, pharmacology, drug development process, biology and so on. Medicinal radiopharmaceutical chemistry cuts across even more boundaries, such as nuclear instrumentation, radiation physics, radiation mathematics, instrument automation, drug design, regulatory affairs related to medicinal compounds, pathophysiology, molecular biology, research and development techniques apart from these mentioned above.

My Personal Teaching Philosophy

I am a proponent of multidisciplinary learning and teaching, as I believe it is one of the best ways to bring lessons learnt from the various classrooms to real life, equipping students with the knowledge and skills to solve complex everyday problems in a harsh out-of-classroom environment. However, the question is—how scientifically or artfully could these multiple factors be effectively integrated, resulting in a successful single coherent theme, effect or solution?

Recommended Citation

Saw, M.M. (2013). Designing a new interdisciplinary module on medicinal radiopharmaceutical chemistry: A feasibility study. *CDTL Brief*, 16(1), pp. 2-6.

Table 1. List of target audiences.

No	Audience	Organiser/Place	Class Size
1	Scientists (Molecular Imaging)	Various Departments	10
2	Faculty members		
	a. Food Sciences Technology	Food Sciences Technology Department, NUS	6
	b. Medicinal Chemistry	Medicinal Chemistry Programme, NUS	12
3	MSc by course work students	Department of Chemistry, NUS	4
4	Chemistry Honours students	Department of Chemistry, NUS	2
5	Nuclear Medicine Physicians	Department of Diagnostic Imaging, NUH Department of Nuclear Medicine and PET, SGH	5-10
6	Radiochemist/ Radiopharmacist	Various Radiopharmacy Units in other countries (Vietnam, Philippines, Thailand, Mongolia, Egypt)	3-10
7	Junior College School Teachers	Medicinal Chemistry Programme, NUS	15
8	Radiographers	Department of Diagnostic Imaging, NUH	7
9	Nanyang Polytechnic, Year 3 Radiography Students	Nanyang Polytechnic, Year 3 Radiography course moderators	35

As a part of the PDP-T teaching practicum, I conducted a feasibility study on the design of a new interdisciplinary module on medicinal radiopharmaceutical chemistry. Acceptance and meeting learning objectives were measured by compiling and analysing the engagement levels of the audience in response to a fixed-theme presentation.

Student Engagement

As defined by Natriello (1984), student engagement is seen as students “participating in the program activities”. A more recent definition by Skinner and Belmont (1993) refers to it as students “showing positive emotions during on-going action”, or “showing sustained behavioural involvement in learning activities accompanied by a positive emotional tone”.

How is student engagement measured? According to Elaine Chapman (2003), it can be measured in five ways;

- 1. Self-Reports**—affective engagement questions which typically ask students to rate their interest in and emotional reactions to learning tasks on indices,
- 2. Checklists and Rating Scales**—summative rating scales to measure student engagement levels,

3. Work Sample Analyses—evidence gathered from student projects, portfolios, performances, exhibitions, and learning journals or logs, suitable for use in classroom situations,

4. Focused Case Studies—restricted to a small target group of students, to collect detailed descriptive accounts of engagement rates, and

5. Direct Observations—momentary time sampling system, which records whether the desired learning behaviour is present or absent during a specific time period, in class-wide observations.

Study Design

I had given a presentation with the same core material to a range of target audiences (see Table 1). The only difference is the length of the presentations (between 1 to 3 hours) and emphasis on certain parts depending on the target audience. I used the direct observation method to determine audience engagement levels.

The presentation covers the construction of a targeted radiopharmaceutical (the presentation’s overarching subject theme being medicinal radiopharmaceutical chemistry)

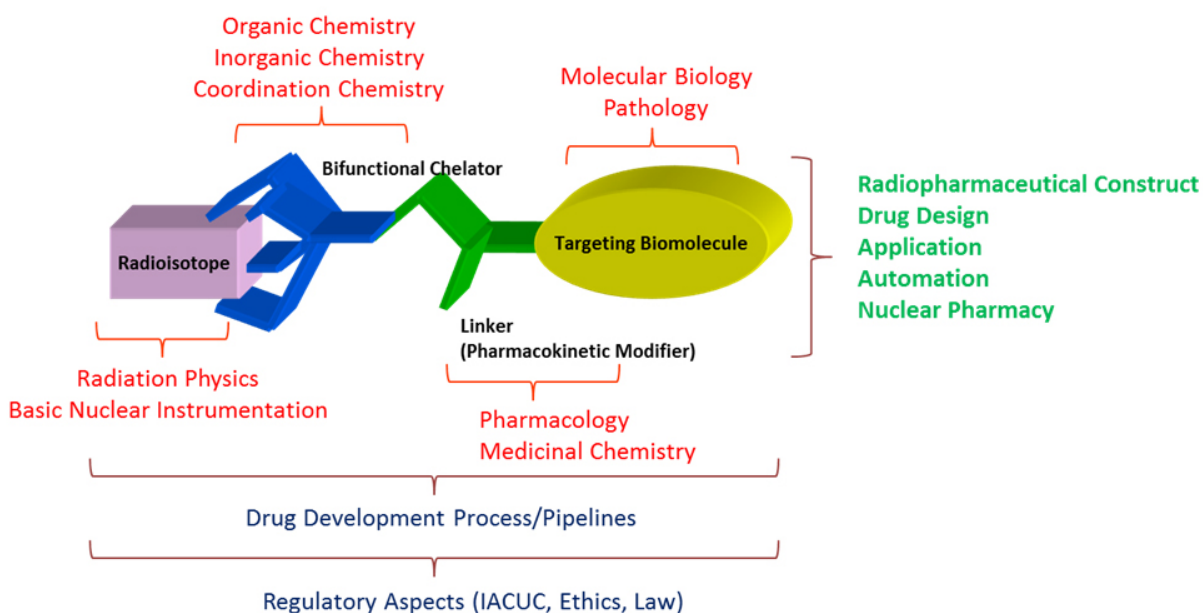


Figure 1. Subject matter coverage.

by a combination of the following key elements: radioisotopes (nuclear chemistry, nuclear physics), targeting biomolecules (biology), bifunctional chelators¹ (organic chemistry, coordination chemistry), probe design (medicinal chemistry), purpose of radiopharmaceuticals as agents for medical imaging (nuclear instrumentation) (See Figure 1).

This single presentation is designed as a pilot to determine the audience's response to an interdisciplinary topic.

The same presentation style was used across all sessions to ensure consistency. The aim of my presentation, i.e., that students attain a basic understanding of medicinal radiopharmaceutical chemistry, was clearly conveyed to the audience before I began. I started by explaining fundamental knowledge relevant to the module, used examples to show how the respective topics in the basic sciences were linked to real-life products or processes using examples, and how a particular subject/topic was or could be iteratively linked to other disciplines in developing a new product or discovering a mechanism.

As mentioned early, the direct observation method was used to determine audience engagement levels. Approximately 5 minutes for each target audience per lesson were

allocated. As the audience size was between 5 to 30 students, majority of the audience could be sampled for behavioural observation.

The following behaviours were noted as positive indicators:

- enthusiasm, optimism, curiosity, interest,
- asking relevant questions, and
- participating in relevant discussions.

The following behaviours were noted as negative indicators:

- disaffection,
- passive, bored, depressed, confused,
- withdrawn from learning opportunities, and
- rebellious towards teacher and classmates.

Feedback from the course organisers were also collected via email response and short discussion after the presentation. Classroom behavioural observations and feedback from the course organisers were then analysed and integrated as a general score rating of one to five, as follows:

- Score 1: Disastrously failed to engage,
- Score 2: Failed to engage,
- Score 3: Not satisfactory,
- Score 4: Satisfactorily engaged, and
- Score 5: Very satisfactorily engaged.

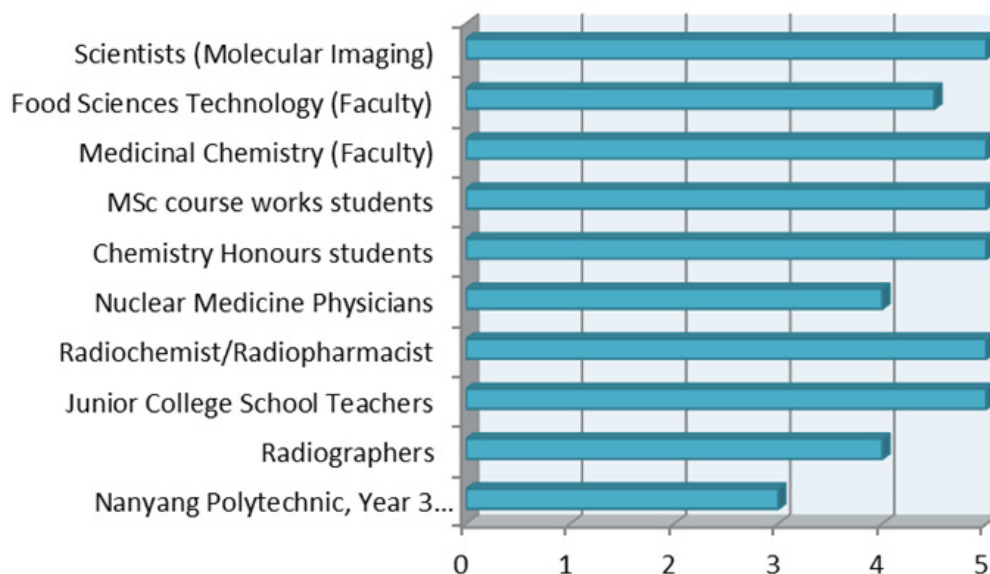


Figure 2. Results of the analysis of classroom behavioural observations and feedback.

Results & Discussion

Results of the analysis are mentioned in Figure 2.

In general, the interdisciplinary topic on medicinal radiopharmaceutical chemistry was well received and engaged the audience. Highly complex subjects might not be suitable for undergraduate students with focussed studies, as evident from the lower satisfactory score given by the polytechnic students (see Figure 2). A more subtle or convincing way of presenting the content will be required. The audience should be selective, rather than broad-based. The creation of new interdisciplinary modules may require a suitable home ground which is adaptable and able to accommodate a new form of teaching which crosses many disciplinary boundaries.

It was better perceived by the audience who were either inclined, pre-conditioned or adaptable towards creative thinking, medicinal applications and cross-boundary learning, such as the Chemistry Honours students and graduate students doing MSc by course work (see Figure 2). In fact, a number of students had chosen interdisciplinary topics despite being presented with a multitude of choices for

their research module. It is a very encouraging sign, though the percentage of those within the student population who are interested have yet to be determined. One of the more surprising findings was that this topic was enthusiastically received by junior college (JC) teachers. That might mean interdisciplinary thinking is an area of current interest for them.

This feasibility study gave me assurance that adopting an interdisciplinary approach is well worth further exploration, leading to the creation of a new interdisciplinary module and submission to the curriculum committee for consideration. Based on the findings in my practicum and this article, I have since created a module, MDG5225 “Fundamentals of Molecular Imaging”, with approval from my department. The School has been offering this module since Semester 1 of AY2012/2013. Another module, MDG5228 “Hybrid Imaging: An Advanced Imaging Concept and Modality” has been approved by the Board of Graduate Studies and will be offered in the next semester (Semester 1, AY2013/2014).

Endnote

1. Chelation describes a particular way that ions and molecules bind metal ions.

continued on the next page ...

References

- Chapman, E. (2003). Assessing Student Engagement Rates. *ERIC Digest*. ERIC Identifier: ED482269.
- Davis, J. R. (1995). *Interdisciplinary Courses and Team Teaching: New Arrangements for Learning*. Phoenix, AZ: American Council on Education & Oryx Press.
- Holley, K.A. (2009a). Interdisciplinary strategies as transformative change in higher education. *Innovative Higher Education*, 34(5), pp. 331-341.
- Holley, K. (2009b). Understanding interdisciplinary challenges and opportunities in higher education. *ASHE Higher Education Report Series*, 35(2). San Francisco, CA: Jossey Bass.
- Mansilla, B. V. & Duraising, E. (2008). Targeted assessment of students' interdisciplinary work: An empirically grounded framework. *Journal of Higher Education*, 78(2), pp. 218-237.
- Natriello, G. (1984). Problems in the evaluation of students and student disengagement from secondary schools. *Journal of Research and Development in Education* 17, pp. 14-24.
- Skinner, E.A. & Belmont, M.J. (1993). Motivation in the classroom: Reciprocal effects of teacher behaviour and student engagement across the school year. *Journal of Educational Psychology*, 85(4), pp. 571-581.
- Stone, T., Bollard, K. & Harbor, J. M. (2009). Launching interdisciplinary programs as college signature areas: An example. *Innovative Higher Education*, 34(5), pp. 321-329. ■

ABOUT THE AUTHOR



Dr Maung Maung Saw currently teaches the graduate module MDG5225 “Fundamentals of Molecular Imaging”. As a proponent of interdisciplinary teaching, he is pleased to see that a number of graduate students from different faculties have enrolled into this module and are enjoying the class.

Distance & Proximity: Teaching Western Architectural History in the Singapore Context

Dr Lillian Chee
Dept of Architecture

Is there a direct relation between historical knowledge and architectural excellence? (Millon, 1960)

When this question was posed in 1960 by the doctoral student Henry A. Millon, who would later go on to become one of the major figures in American architectural historiography, he was sketching out the difficulty of reconciling architectural history's 'proper audience' with the captivated audience provided by the architectural schools' institutional framework. As we can see in the following paragraphs, Millon's anxiety was neither eccentric nor short-lived.

Challenges of Teaching Architectural History

In the last five years alone, many articles¹ have expounded on the limits of architectural historiography, and many more hours of debate expended on the same topic at international meetings and conferences². The points of contention have been with the contradictory nature of the two overlapping disciplines—architecture and history—the former with its mandate to boldly invent anew at every possible opportunity, the latter to be more circumspect and critical of patterns of change. Above all, there is also the need to contend with the disciplinary limits of the term 'architecture', which architectural historian Andrew Leach explains is "marked by conceptual and technical

fluidity" (2010, p. 5), as much as it is subject to what architectural theorist Karen Burns sees as a strict concern for a "history of proper names", that is, buildings designed by architects of particular repute (Burns, 1996; Upton, 2002).

Yet, architecture can be, and is, much more complicated than buildings alone. Leach (2010) reminds us that "architecture is sometimes studied on its own terms, but it is just as often tabled as evidence for problems that are not architectural in nature" (p. 11). An example may be that when students study the emergence of the apartment block in Haussmann's nineteenth-century Paris, they also confront issues of class divisions, gendered and social living arrangements, patterns of domestic life, modes of consumption, and get a sense of what was popular then. According to Leach, the questions that consequently emerge from this subject matter may be: Is the apartment block "exemplary, or symptomatic? Is it important architecturally, or historically?" (p. 12). For many theorists, historians and academics, this kind of ambiguity, with its inherited methodological and conceptual problems, is critical for not only keeping architectural history relevant to the discipline and the profession, but more importantly, for cultivating architecture "as a subject (that) sustains perpetual scrutiny from many angles, which in turn feeds back into the knowledge base of architectural historians to the subject's further enrichment" (pp. 12, 13)³.

Recommended Citation

Chee, L. (2013). Distance & proximity: Teaching Western architectural history in the Singapore Context. *CDTL Brief*, 16(1), pp. 7-11.

Developing the Module: Ensuring Reach and Relevance

I have also been preoccupied with similar questions since 2007, when I was given the responsibility of conducting a survey course in Western architectural history for third year architecture students. What seemed like a straightforward task of imparting specific canons of architecture historical knowledge to an undergraduate cohort became increasingly complex once questions of what to include, how much to include, and how to organise this unwieldy material to fit into the condensed space of twelve weeks, surfaced. While the generally accepted approach was to run the module chronologically, focusing on the sequence of architectural styles and movements changing over time, and to raise certain key architects and their works as exemplars, I decided against this structure because it would only be meaningful if students had experiential access to such kinds of architectural evidence. Barring this, the exercise would be purely academic, thus enacting, on the students' part, a dutiful regurgitation of the Western architectural canon without them ever internalising its lessons, problems or opportunities.

Two recurring questions kept the module (and me) on its (my) toes.

For one thing, there was the inescapable question of *distance*—both in time and in space—as we negotiated subjects as distant and as foreign as the Greek Acropolis (dating back to the 5th century BC) and moving only as far forward as the British-inspired Arts and Crafts movement (late 19th century AD). For another, there was always the unspoken but persistent query whether there was substantial *relevance*—direct or indirect—in offering such academic knowledge to a group of students bent on a professional career, since it was arguable whether lessons from say, the Italian Renaissance, would figure at all in the contemporary dealings of an architectural firm.

Undoubtedly, the twinned difficulties of reach and relevance shaped the whole tenor of the module as it was reworked (and continues to be

revised) to engage the Singapore architectural context. The distance of the content from contemporary Singapore, and the proximity of the subject matter—architecture—to the architecture student, proved to be two opposing obstacles—one alien, the other familiar. These polarised qualities provided a certain degree of tension, but I would emphasise, not one that was altogether unproductive. In this short essay, I wish to briefly reiterate the intricacies of the discipline we call architectural history, and to suggest that the problem of organising the past may be conceptualised as a fruitful epistemological struggle, which should be actively shared and experienced, instead of merely consumed, by students.

Teaching Strategy: Placing Architectural History in a Contemporary Context

My first instinct was to ask how this knowledge would be relevant to a third-year architecture student based in Singapore given that “architectural history...shares the question of instrumentality operativity with many branches of history” (Leach, 2010, p. 105). The module and its assignments were structured, unconsciously at first, but on hindsight now, to implicitly address the question of architectural history's function in the context of contemporary architecture. Would this knowledge not only provide all architecture students with the erudition they required but also help them nurture analytical skill sets, which they could develop on their own, to actively reassess and participate in contemporary architectural critique?

Thus, instead of perceiving Renaissance architecture as simply a foreign historical style, would it be possible to approach it simultaneously from several angles? For instance, the approach may provide the necessary context for seeing architecture as material evidence of its age, bearing similarities in its character to the art and sculpture of its time, thus connecting architecture to the social, economic and political forces of the milieu. It may give students the impetus to understand architecture structurally through its technological limitations and

advances during this period of innovation; or even, to locate, compare and contemplate on Renaissance architecture as a reaction to what went before, and how it provoked what went after. In all these examples, the crucial concept was that of *connection*—being able to see architecture from within but also outside itself, to be conscious of its ‘exterior’ as it were, and to continually redefine architecture through its complex network of actors, resources, territories, and conventions.

Teaching Strategy: Adopting a Thematic Approach

My strategy was to scramble the lecture content, rejecting a chronological sequence in favour of thematic association. In this, I used the conjunctive subtitle “Architecture & ...” to open a series of discussions dealing with the body, spectacle, technology, nature and utopian ambitions. Architectural movements across time were paired and studied for coincidences and divergences: the incorruptible body upheld in Greek and Roman architecture against the humanistic body of the Renaissance; comparing mass-produced Industrial Revolution architecture with the fragile but also mathematical and ‘modular’ Gothic spires; the multiple meanings drawn from the elastic concept of ‘nature’ seen through the gardens of the Picturesque movement, and later in the buildings and goods produced by the Arts and Crafts practitioners; the spectacle of religion in Baroque Rome beside the scale of capitalism in Hausmann’s Paris. Here, the idea was to get the student to see these historical subjects as intentionally suspended between different realms of perception and discourse. In this sense, the students became knowing collaborators in the re-organisation of this history. Debating whether an architectural movement should be classified under one theme or another is only possible when the movement is understood beyond its insular facts.

Module Activities & Student Responses

Such thematic organisation also “demonstrate(s) an interdisciplinary consciousness whereby one understands where architecture sits in

relation to its various physical and conceptual settings” (Leach, 2010, p. 72). In other words, students learn to recognise the criticality, influence and value of architecture’s ‘edges’ (Leach, 2010). To reinforce this point, the assignments for this module were structured as a series of writing projects, building up in scale from literature review towards a full-length essay. Students were guided through a series of four seminars, where they were asked to consider similar kinds of connections between architecture and its ‘exterior’ or ‘edge’. In addition, these texts focused on issues pertinent to contemporary architecture, and as such, neither duplicated nor related directly to the material covered in the lecture. However, not all students recognise the critical utility of this approach. Rather than seizing the opportunity to question and reorganise architectural epistemology, students often lament that the lecture content could be reinforced by the assignments, despite being clearly briefed at the start of the module, and then subsequently at different intervals throughout the semester on why different kinds of assessment activities were set, with the specific rationale for each component repeatedly highlighted. Students often described the relationship to Singapore or the local context as being ‘irrelevant’. As one student puts it, “[t]he topics covered during the seminars were not really relevant to what was being taught in the lectures. They were very Singapore-centric and on the surface do not appear at all related to what we’re being taught on Western architecture.”

I have a very different view to this grievance. The large body of knowledge derived from the lecture material is necessarily examined in a more finite situation, that is, through an end-of-year test comprising short-answer and multiple-choice questions. This mode of testing responds to the requirement of a survey module, in which students are supposed to have a broad working knowledge of specific ideas, buildings, techniques, innovations and their influences. The writing projects, on the other hand, enable a more leisurely, in-depth and independent exploration of the kinds of techniques, connections and ‘edges’ sampled during the

lecture sessions. In their assignments, students are also asked to think specifically about how the ideas are relevant to the Singapore context, and to independently suggest a subject matter which they could investigate firsthand to test out their propositions. So while the module is ostensibly about Western architecture, it attempts to question, reorganise and ‘re-situate’ such knowledge within the reach and relevance of the architectural cohort here. The writing projects operate as exploratory vehicles, used to interrogate the ‘functionality’ of architectural history in a context vastly different from the original Western subject matter, and to encourage students to find their own voice amidst the multiple, and often contradicting, opinions and critiques embedded within their chosen subject.

Feedback from students suggest that they have taken away from the classroom something more than just raw historical data. One student thought it was an “[e]xcellent lecture series introducing Western architecture history in an engaging manner with sufficient breadth and depth to give students a working understanding and platform to perform their independent inquiry into a topic of personal interest in the future’. Another commented that “...the content was rich, interesting and thought provoking... [it] pushed ... us to think, investigate and research on the leading architectural ideas, as well as [developing] an interest towards a broader range of inter-disciplinary study and was also smartly connected ... to the local context’. Finally, yet another student shared that the lecture series ‘... [have] really benefitted us not only in architectural knowledge, but (introduced) an advanced way of thinking about history’.

Concluding Remarks

Architectural history is not only about “facts, impressions, and appreciations of existing large-scale social artifacts – but [should]... also provide an adequate exposure to the range of ideas, aesthetic effects, technical solutions, social formulations, and specialized traditions which constitute an architectural heritage” (Jacobs, 1965, p. 68). In the last decade, the tools and strategies of architecture have been applied by architectural practices such as the Office of Metropolitan Architecture (OMA) and the Netherlands-based architecture and urban design practice MVRDV, as well as research groups such as the Think Tank studio at the University of Columbia, to shape “governance, capital, consumerism and national and continental identities” (Leach, 2010, p. 132). In this sense, as the boundaries and agendas of architecture change, so too must architectural historiography and the way architectural history is taught and received. Perhaps, the default distance between the Singapore context and the Western architectural tradition is not a weakness after all. The student’s active re-organisation of borrowed ideas, and the persistent need to locate his/her own position in relation to these ideas, ensures that their knowledge of architectural history remains fluid and contingent to their individual contexts. It gives the student agency over this otherwise abstract form of knowledge and enables action with regards to the various ‘ideological, historical and worldly forms’ (Hays, 2007) that architecture may assume.

Endnotes

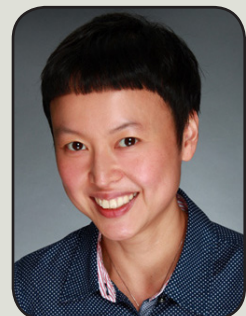
1. For publications see for example, Celik, Z. (Ed.) (2002). *Teaching the History of Architecture: A global inquiry*. Special issues, *Journal of the Society of Architectural Historians*. Part 1, 61(3) (September 2002), pp. 333-96; Part 2, 61(4) (December 2002), pp. 509-58; Part 3, 62(1) (March 2003), pp. 75-124.
2. Conferences include those held by the Society of Architectural Historians (SAH), Society of Architectural Historians, Australia and New Zealand (SAHANZ), International Association for the Study of Traditional Environments (IASTE), and the Society of Architectural Historians of Great Britain (SAHGB).
3. For current arguments on architectural historiography, see for example, Borden, I. & Rendel, J.I (Eds.). (2000). *Intersections: Architectural Histories and Critical Theories*. London: Routledge; Arnold, D., Ergut, E.A. & Ozkaya, B.T. (Eds.). (2006). *Rethinking Architectural Historiography*. London: Routledge; Arnold, D. (2002). *Reading Architectural History*. London: Routledge; Hays, K.M. (Ed.). (1998). *The Oppositions Reader*. Cambridge, Massachusetts: MIT Press.

References:

- Burns, K. (1996). *Architecture/Discipline/Bondage*. In McCorquodale, D., Wigglesworth, S. & Ruedi, K. (Eds.), *Desiring Practices: Architecture, Gender and the Interdisciplinary* (pp. 72-87). London: Black Dog Publishing.
- Jacobs, S.W. (1965). *History: An orientation for the architect*. In Whiffin, M. (Ed.). *The History, Theory and Criticism of Architecture*, (p. 68). Papers from the 1964 AIA-ACSA Teacher Seminar, Cambridge, MA.
- Hays, K.M. (2007). Notes on narrative method in historical interpretation, *Footprint 1*, p. 23.
- Leach, A. (2010). *What is Architectural History?* Cambridge: Polity Press.
- Millon, H.A. (1960). History of Architecture—How useful? *AIA Journal* 34(6), p. 24.
- Upton, D. (2002). Architecture in everyday life. *New Literary History*, 33(5), pp. 707-723. ■

ABOUT THE AUTHOR

Dr Lilian Chee teaches History and Theory of Western Architecture at Levels 2000 and 3000, architectural design at Levels 2000 and 5000, and several masteral level modules. She relishes the challenge of changing students' mindsets about historical knowledge by bringing the concepts up-to-date and making them relevant to each student's experience.



Enhancing Nursing Students' Drug Calculation Skills Through Self-directed Learning

Ms Chen Hui-Chen

Alice Lee Centre for Nursing Studies

The ability to do self-directed learning (SDL) is beneficial to nursing students in developing a lifelong learning habit that will stand them in good stead in their future careers. This is because nurses not only have to acquire medical knowledge throughout their formal education, they also need to constantly refresh and update their knowledge even after they graduate. For example, the correct methods of doing drug calculation can easily be forgotten without regular practice. If nurses are able to regularly refresh their knowledge of the correct mathematical calculations and important formulae for drug calculation through an easily accessible learning interface, medical errors would less likely occur in hospitals. With the advent of information technology, online resources for honing one's skills in SDL are

widely available. Nevertheless, the habit of using these resources frequently and effectively still needs to be cultivated.

Outcomes and Methodology

This project aims to study whether SDL using online resources can improve our nursing students' ability to do drug calculation. A website which aimed to foster SDL skills was created for nursing students who took the module NUR2114 "Medical-Surgical Nursing I". This website (Figure 1) emphasised the drug calculation component in the module. Students could access the website at any time and from any place that they prefer, and they could study the drug calculations as many times as they wished.

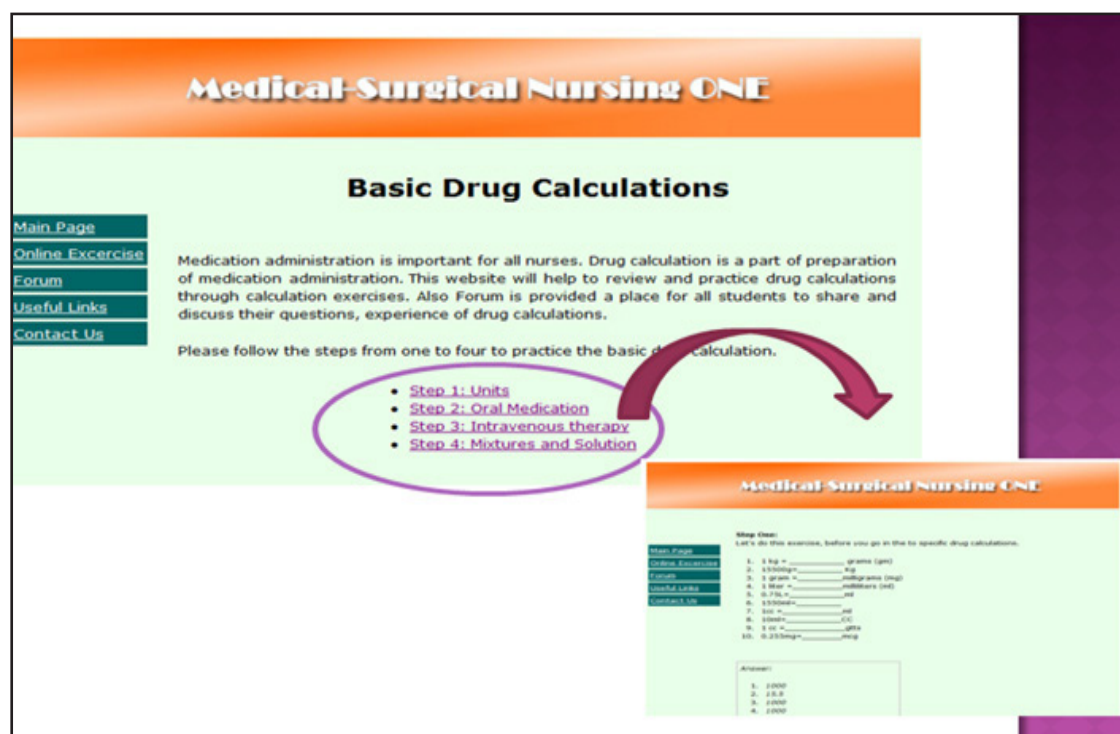


Figure 1. The main page of the website on drug calculation for NUR2114.

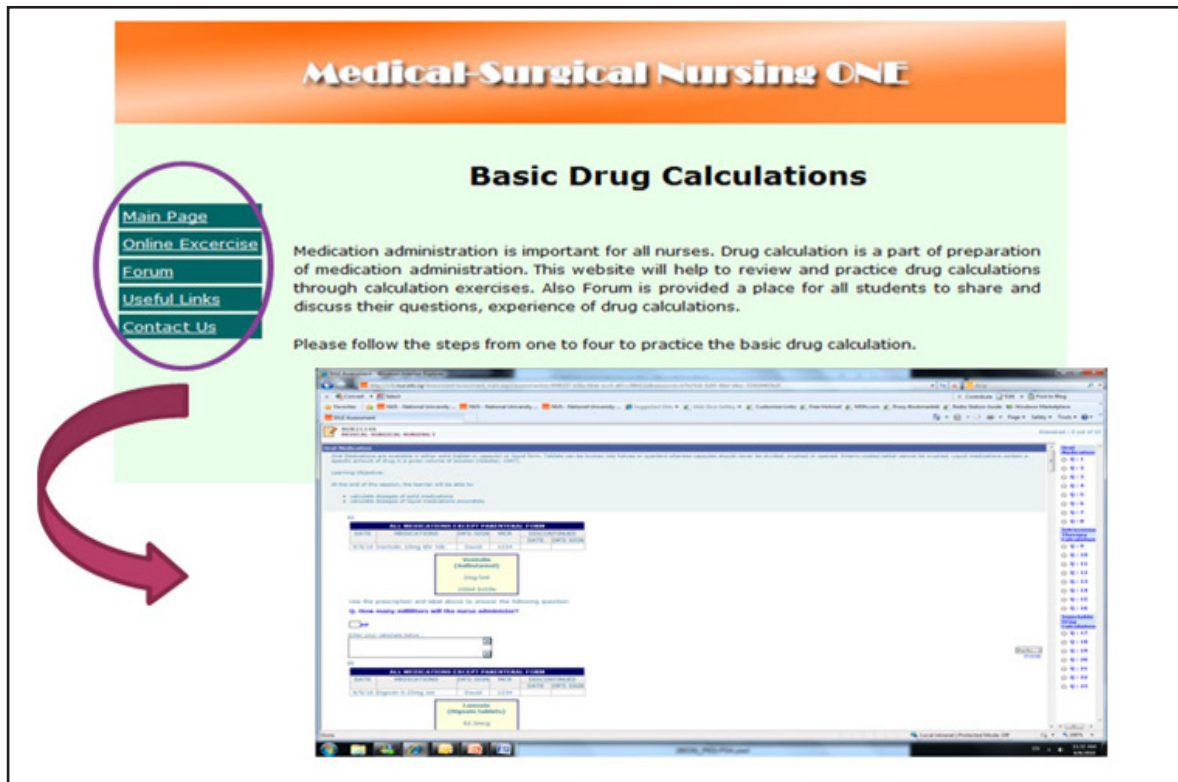


Figure 2. Screen capture of the website's exercise section.

The website not only facilitated the learning of the basics of drug calculation, it also included resources and functions which would enhance students' knowledge of this component of NUR2114. The website's exercise section (see Figure 2) allowed students to practice the calculations they learnt, and the website's forum enabled them to post and discuss questions with their peers. The students could also communicate with their tutors through emails, in addition to regular lectures and office hours. Other useful links to additional learning resources were also provided in the website.

A pre-test/post-test research design experiment was used to measure the impact of such an intervention. The subjects were second year nursing students who took NUR2114 in the first semester of Academic Year 2010/2011. A total of 93 students enrolled for this module. While all the students had the same rights in accessing the web resources, participation in this teaching experiment was voluntary and anonymous.

Among the 81 students who completed the pre-course assessment and survey in the first lecture, 80 of them also completed the post-course assessment and survey towards the end of the semester

Data Collection

The assessments and surveys were administered before and after the practicum to measure the impact of online SDL. Specifically, the pre-course drug calculation assessment and survey were conducted at the very beginning of the semester before students embarked on any online SDL activities. This served as the baseline data. Students took the post-course drug calculation assessment and survey after using the website for ten weeks. The two sets of results were compared and analysed to evaluate the impact of the intervention on students' SDL skills. The SPSS statistical software package was used to analyse the data collected.

Recommended Citation

Chen H.C. (2013). Enhancing nursing students' drug calculation skills through self-directed learning. *CDTL Brief*, 16(1), pp. 12-16.

Table 1. Results of the pre- and post-course self-directed learning tests.

	Pre-course Self-Directed Learning	Post-course Self- Directed Learning
Mean (SD)	80.75 (2.463)	99.5 (0.303)
Minimun-Maximun	10-100	80-100

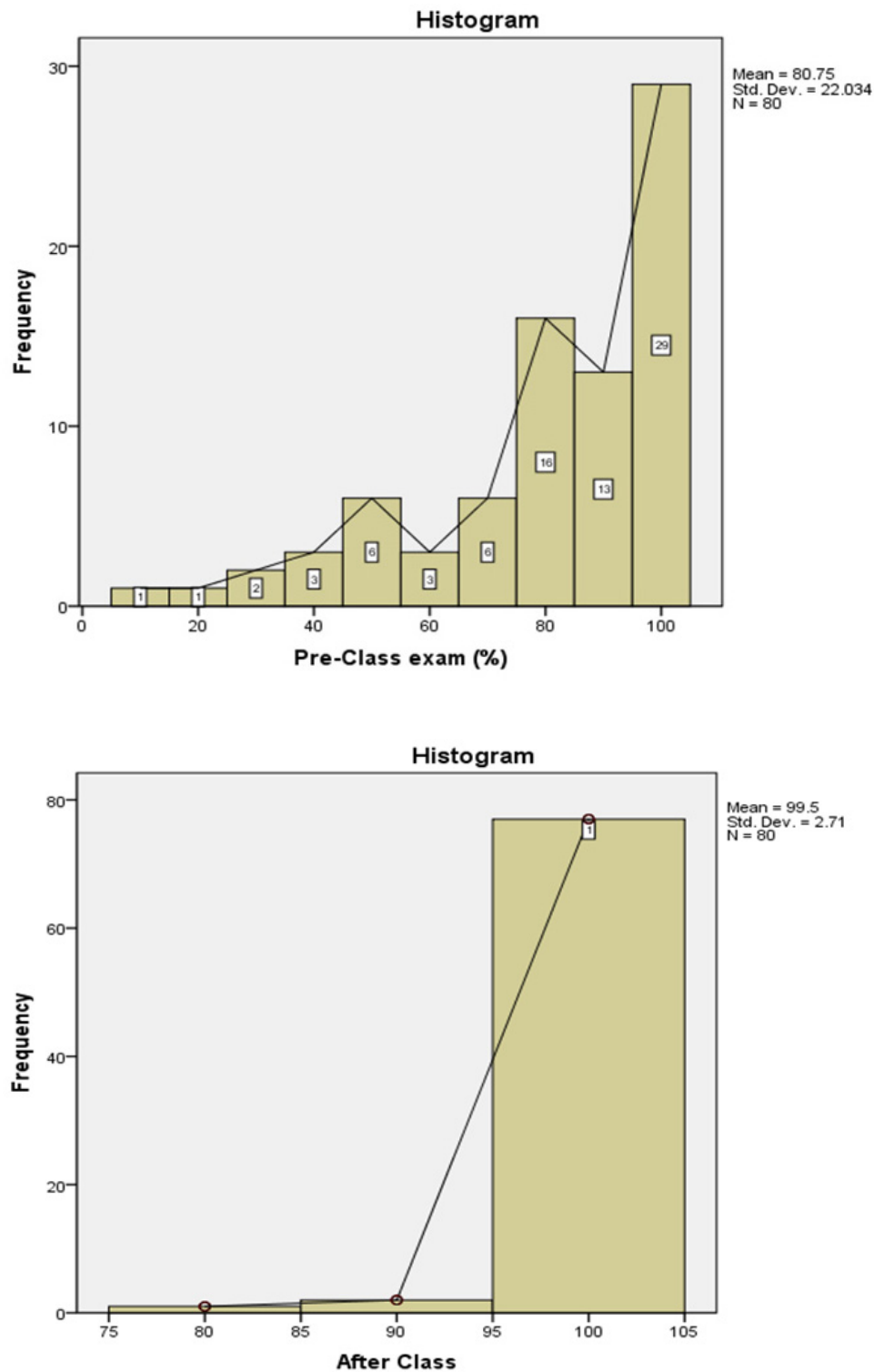


Figure 3. Histograms showing the results of the pre- and post-course SDL tests.

Results & Analysis

The pre- and post-course SDL assessments and surveys were analysed and summarised as follows:

Profile of students

- Before doing the SDL activities in the course, 85% of the participating students had not learnt about drug calculation, and only half of these participants had ever used online resources as a study aid in the past. Additionally, more than 83% preferred traditional pedagogies (e.g., lectures, tutorials, and laboratory sessions) to online learning.

Improvements in learning

- The participants experienced a dramatic improvement in their knowledge of drug calculation after doing the SDL activities (See Table 1 and Figure 3). The average score in the pre-course SDL test was 80.75 (with a standard deviation of 2.46), but it significantly improved to 99.5 (with a standard deviation of 0.30) in the post-course SDL test.

In addition, the data also indicated the following:

- 89% of the participants used the online web resources provided in this project throughout the experiment.
- 90% of the participants enjoyed the website's SDL activities.
- 96% of the participants believed that for basic drug calculation, the SDL activities can be good substitutes for traditional pedagogies.
- 96% of the participants agreed that after this project, they were more confident about doing drug calculations during their hospital attachments.

The participants also shared their experiences regarding the use of SDL as a teaching method. Some of the representative comments we garnered were as follows.

The topic is suitable for SDL activities

On whether drug calculation is a subject that is suitable to be learnt through SDL activities:

- “Drug calculation can be learnt easily through self-directed learning.”
- “It’s a very easy topic so do not need a lecture on it. Self-learning is sufficient.”
- “Basic [d]rug [c]alculation is easily learnt and is simple math. Therefore it can be a self-directed learning.”
- “No need to waste time we can learn ourselves.”

Sufficient foundation knowledge in mathematics facilitates SDL

On whether students have sufficient knowledge in mathematics to conduct SDL:

- “Basic drug calculation is easy to learn by self-directed learning as we have already have the foundation for basic math and thus easy to learn and do the calculations.”

SDL makes it less stressful

On whether SDL for drug calculation is less stressful than learning the same knowledge in a class:

- “I find it better to learn without stress [and] at my own.”

SDL offers flexibility in learning

On whether the SDL approach was more flexible for learning drug calculation, students can study the materials at their preferred pace:

- “Self-directed learning is suitable for calculation as different people require different pace to comprehending time. Able to understand more.”
- “Different people have different ways of understanding formula/concepts during calculation.”

Immediate feedback provided

On whether the SDL interface provided immediate feedback to the students:

- “[The] [o]nline quiz was helpful as it provides information and we can get back the results immediately. In this way, we can learn from our mistakes.”

Sufficient resources in the SDL interface

On whether the SDL interface provided adequate resources:

- “The online resource and materials had sufficient information to learn.”

Other positive comments from students included the following:

- “Helps us to understand better”
- “Self-directed learning is awesome.”
- “Self-direction leads to have discovery.”
- “We will remember more if self-directed.”

Concluding Remarks

In conclusion, current knowledge about drug calculation is essential for nurses to reduce their risk of committing medication errors and enhancing patient safety. In this regard, nurses need to keep maintaining and updating their knowledge of drug calculation. In this teaching experiment, we introduced an SDL interface

with online resources to our nursing students, and the impact of this learning method was evaluated. A comparison between the pre-course and post-course assessments and surveys suggested that the learning method using SDL interface enhances our students’ learning experience. They felt that the SDL interface was a suitable tool for learning drug calculation. Overall, the teaching practicum was successful. Colleagues from other disciplines can consider incorporating such an online learning interface to cultivate SDL skills in their modules in the future to test its general applicability.

References

- Ashby D.A., (1997). Medication calculation skills of the medical-surgical nurse. *MEDSURG Nursing*, 6(2), pp. 90-4.
- Gillham D., & Chu S. (1995). An analysis of student nurses’ medication calculation errors. *Contemporary Nurses*, 4(2), pp. 61-64.
- Grandell-Niemi H, Hupli M, Leino-Kilpi H, & Puukka P (2003). Medication calculation skills of nurses in Finland. *Journal of Clinical Nursing*, 12(4), pp. 519-28.
- Wright K., (2010). Do calculation errors by nurses cause medication errors in clinical practice? A literature review. *Nurse Education Today*, 30(1), pp. 85-97.
- Wright K, (2008) Can effective teaching and learning strategies help student nurses to retain drug calculation skills? *Nurse Education Today*, 28 (7), pp. 856-64. ■

A **ABOUT THE AUTHOR**

Ms Chen Hui-Chen teaches NUR2114 and NUR2116 “Medical-Surgical Nursing I& II”. She believes that future healthcare providers should be encouraged to enhance their clinical knowledge and skills with a self-directed learning (SDL) approach in order to promote self-management and self-monitoring as well as stimulate motivation.

Bring Your Own Dataset: A Student-centred Approach to Teaching Biostatistics

Dr Agus Salim & Assoc Prof Gerald Koh Choon Huat

Saw Swee Hock School of Public Health

Background & Introduction

Biostatistics is broadly defined as the application of statistical techniques to scientific research in health-related fields, including medicine, biology, and public health, and the development of new tools to study these areas. Biostatistics plays an integral part in public health research and is used as one of the main analytical tools in areas such as identifying disease risk factors, determining the outcome of public health interventions, and forecasting trends of disease burden. In recognition of this, most graduate programmes in public health require students to take one or more Biostatistics modules that would equip them in their research and professional career. In our Master of Public Health (MPH) programme, we offer two Biostatistics modules and the first author has been teaching one of them, COS5218 “Advanced Quantitative Epidemiology” (AQEM), which is an elective module taken by students with clinical epidemiology specialisation. The module has always been taught as a 1-week teaching block where each day is dedicated to the teaching of one of the following topics:

- multiple linear regression,
- logistic regression,
- survival analysis, and
- analysis of repeated measurements

The four topics cover different major statistical methods that the students will most likely need to use in their professional career. The first author co-teaches this module with another colleague and each teach two topics. In his case, he teaches logistic regression and the analysis of repeated measurements.

In the AQEM module, students are exposed to practical sessions using STATA software (www.stata.com). The practical session is meant to equip students with experience in analysing real datasets in order to tackle real-life research questions.

In a typical practical session, students use a real dataset that we have prepared. In the first part of the session, the lecturers guide the students to apply the statistical methods they learnt during the lecture. In the second part, the students have to complete an exercise in which they need to use appropriate statistical methods and certain variables in the dataset to answer a series of scientific questions that we have prepared. The students' answers to this exercise form the basis of their individual reports and group presentations which together constitute 50% of the total assessment for this module. While students are required to attend practical sessions for all four topics, for the purpose of the group presentations and individual reports, students are randomly allocated to one of the four groups, with each group being responsible for one topic.

Recommended Citation

Salim, A. & Koh, G.C.H. (2013). Bring your own dataset: A student-centred approach to teaching biostatistics. *CDTL Brief*, 16(1), pp. 17-21.

Conducting the Proposed Scheme

Over the years, through personal observations and informal chats with students, it was noticed that their interest in the practical session varied greatly from one student to another. Based on the information gathered from such chats, the main reason why some students were not interested in the exercise was because the dataset (prepared by the lecturers) often comes from a branch of medicine/health science which is different from the student's own professional background. This lack of interest is of particular concern as students enrolled in the MPH come from various educational and work backgrounds. A student from a gastroenterology background, for example, may not be very motivated to answer exercise questions related to a dataset that comes from a cardiovascular research setting. This is because the student does not see the relevance of such questions to his/her current and future work. This perception could not only affect the student's interest and motivation for the entire course, but it could also affect his/her view on the usefulness of biostatistics for his/her research and professional career. Some articles have argued that a student-centred approach to learning, where students set their own goals and resources to achieve those goals (Jonassen, 2000), was more meaningful to them (Pedersen & Liu, 2003).

To provide MPH students with a better learning experience, the first author proposed an alternative approach where he got them to do *authentic activities* (Herrington et al., 2003). Authentic activities refer to learning activities where students face problems that closely resemble those that real-life professionals have to deal with. Such activities have been used successfully across many disciplines. Examples of authentic activities include the design and construction of a Formula SAE¹ race car as part of a mechanical and mechatronics engineering curriculum (Bullen & Karri, 2002). Hunt et al (2002) also described a project which was a good example of an authentic activity, where instead of the more conventional orientation activities, students addressed issues related to the transition from high school to university by shooting videos of their peers exploring the

university campus and capturing on film the nature of university life. Similarly, Marshall et al (2001) used authentic activities to design a course teaching mathematics to indigenous adults.

In our proposed authentic activity, students are allowed to bring their own dataset to the practical session and with the first author's input, form exercise questions out of their own dataset (see details below). This activity was designed to mimic the situation students would face when they become public health researchers where they would have to perform data analysis and interpret the results.

Methodology

To give students enough time to decide, an email was sent five weeks before the first lesson to all 12 students that have registered for the AQEM module in Academic Year (AY) 2010/2011. The email invited them to participate in this alternative teaching scheme where they can bring their own dataset. The potential benefits of participating in the scheme were outlined which includes working on exercise problems that are more relevant to their research interests, with the possibility of developing the individual report further into a research paper if the student can come up with sufficiently novel and relevant scientific questions. Out of 12 students, four replied to confirm their interest. These students were invited to bring their dataset in for a preliminary one-on-one meeting with the first author.

At the preliminary meeting, the suitability of the dataset was assessed with input from the student in terms of:

1. the complexity of the variables in the dataset,
2. the lack of potential issues that may distract students (such as a large amount of missing data), and
3. whether the two statistical methods the first author was teaching (logistic regression and analysis of repeated measurements) were appropriate to answer the research questions from the dataset.

The first two aspects of the assessment are needed to ensure that the student's dataset has enough complexity so that the exercise questions set were of comparable levels of difficulty to the exercise questions from the original dataset prepared by the lecturers. The third aspect of assessment is needed because the first author could only assess presentations and reports of those students that used statistical methods under the two topics that he was teaching.

The first author spent about an hour with each student, discussing and assessing the appropriateness of their dataset. All four students expressed great interest in the scheme but after going through the assessment with each of them, it was decided that one of the student's dataset was not appropriate because the research questions that were put forward could be more appropriately answered using statistical methods that fall under the topic of linear regression (which the other co-lecturer taught). The remaining three students were invited for a second one-on-one meeting in which the first author and the student worked together to set the exercise questions. The students were allowed to come up with their own research questions while the first author facilitated the process by giving input to ensure that certain standards are maintained, specifically that the questions they set were of a comparable level of difficulty to the questions prepared by the lecturers. To maintain objectivity while grading, the first author tried to be on the 'sidelines' as much as possible by letting the students come up with their own questions and by purposely not examining the dataset beyond checking its basic characteristics.

Feedback

In the post-module feedback, all three students were very positive about the alternative scheme and all of them would recommend that other students participate in it. One student noted that being able to use their own dataset means that the practical session has now "...become particularly relevant and applicable as the student took [a] personal interest in it".

Another student commented on how the scheme was helpful in building his confidence in performing data analysis ("...it allows me to analyse data with more confidence") and how the preliminary discussion meetings with the lecturer can potentially open avenues for research collaboration between the lecturer and the student ("...possible for potential collaboration in research").

Conclusion

Although conducting this scheme was time-consuming, we feel that it is worth the investment of time, as it certainly improves students' confidence and learning experience, as evidenced from their feedback. One of the students continued to collaborate with the first author even after completing the course. Since then, they have submitted a paper to a peer-reviewed journal. The content of that paper was partially based on the research questions they set for the exercise.

However, because of the sheer amount of preparation time the lecturer needs to invest in, which includes assessing the dataset and facilitating the process of setting separate exercise questions for each student, this kind of scheme cannot be offered to a large class. However, it can still be implemented in a medium-sized class (< 50 students) if some students are willing to share their datasets with others.

There is also the issue of comparability of questions for grading purposes. Throughout the scheme, great effort was expended to ensure that the questions from the different datasets were of comparable levels of difficulty. To do this, the first author sometimes had to convince a student to tackle a question that he/she perceived as being more difficult. In such cases, he usually tried to demonstrate to the student the potential benefits of attempting the more 'difficult' analysis and how it can potentially provide better insights, instead of taking the 'easier' option. For the AQEM class, the marks the three students received do not indicate

continued on the next page...

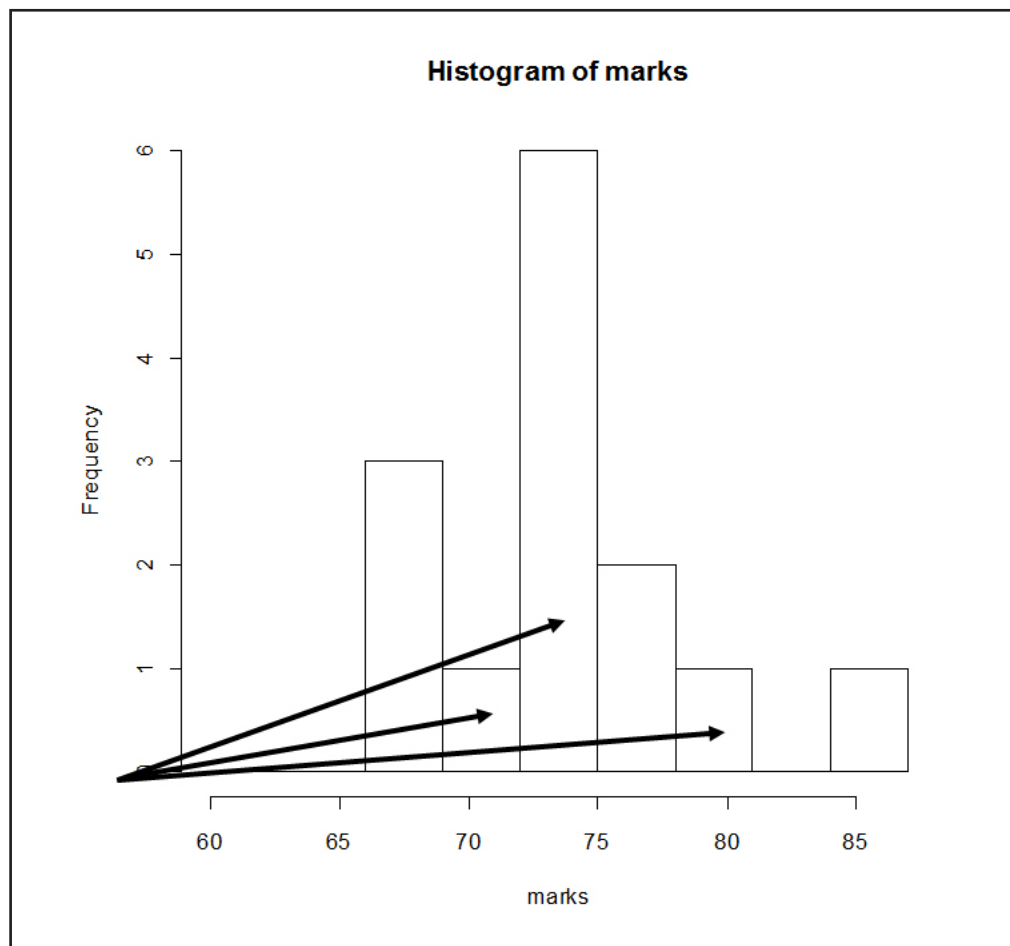


Figure 1. Distribution of the final grades for all students. The arrows indicate the intervals which contain grades for the three students participating in the scheme.

that they were at a disadvantage for using their own datasets, compared to their classmates who used datasets provided by the lecturers

(see Figure 1). Nevertheless, we feel that these challenges should not prevent the running of this teaching strategy again for subsequent cohorts.

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Dr. Agus Salim taught several graduate Biostatistics modules at the Saw Swee Hock School of Public Health (SSHSPH). His lifelong teaching goal is to make the learning of statistics accessible and fun for students without prior statistics or mathematics background.

Assoc Prof Gerald Koh currently teaches family medicine, geriatric medicine and public health to graduate students at SSHSPH. He received both the Faculty Teaching Excellence Award and the University Teaching Excellence Award in 2009.



Endnote

1. “SAE” stands for Society of Automotive Engineers.

References

- Bullen, F. & Karri, V. (2002). Design and construction of a Formula SAE racecar in a teaching and research framework. In A. Goody, J. Herrington & M. Northcote (Eds.), *Quality Conversations: Research and Development in Higher Education*, Volume 25 (pp. 74-82). Jamison, ACT: HERDSA. [verified 6 Feb 2003] <http://www.ecu.edu.au/conferences/herdsa/papers/ref/pdf/Bullen.pdf>.
- Herrington, J., Oliver, R. & Reeves T.C. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology*, 19(1), pp. 59-71.
- Hunt, L., Kershaw, L. & Seddon, J. (2002). Authentic transitions: The click around ECU online transition to university program. In A. Goody, J. Herrington & M. Northcote (Eds.), *Quality Conversations: Research and Development in Higher Education*, Volume 25 (pp. 338-353). Jamison, ACT: HERDSA. [verified 6 Feb 2003] <http://www.ecu.edu.au/conferences/herdsa/papers/ref/pdf/Hunt.pdf>.
- Jonassen, D.H. (2000). Revisiting activity theory as a framework for designing student-centered learning environments. In D.H. Jonassen & S.M. Land (Eds.), *Theoretical Foundations of Learning Environments* (pp.89–121). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Marshall, L., Northcote, M. & Lenoy, M. (2001). Design influences in the creation of an online mathematics unit for indigenous adults. In Kennedy, G., Keppell, M., McNaught, C. & Petrovic, T. (Eds), *Meeting at the Crossroads. Short Paper Proceedings of the 18th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education* (pp. 113-116). Melbourne: Biomedical Multimedia Unit, University of Melbourne. <http://www.ascilite.org.au/conferences/melbourne01/pdf/papers/marshalll.pdf>.
- Pedersen, S. & Liu M. (2003). Teachers’ beliefs about issues in the implementation of a student-centred learning environment. *Educational Technology Research and Development*, 51(2), pp. 57-76. ■

Critical Reading & the Rhetoric of Critical Assent

Assoc Prof Sunita Anne Abraham
Dept of English Language & Literature

Critical reading comprises three main skills: comprehension (making sense of the words on the page), analysis (understanding that texts are rhetorical constructions) and criticism (judging how well a text achieves its author's communicative purpose). Of the three, criticism is perhaps the hardest to teach and learn, given the tradition of adversarial scepticism in academia and the difficulty of prying 'criticism' away from its 'censure' and 'fault-finding' senses. When students treat critical reading as a search for everything that is wrong with a text, rather than as a means of achieving greater understanding, we know the pendulum has swung too far in the direction of dissent.

Yet, most of us probably think our students' problem is not a failure to assent but their inability "*to achieve critical distance, to read against the grain, to 'interrogate'*" (Elbow, 2005, p. 394, italics in original). Elbow's point and mine in this article is that our students often read neither *against* nor *with* the grain, and that they are unlikely to invest in the former until they get better at the latter.

To help our students escape the extremes of "both utter scepticism and rabid dogmatism"

(Booth, 2005, p. 381), we need a notion of critical reading that includes a rhetoric of critical assent. The basic classroom goal of such a rhetoric is to get students "never to assent to or reject any new position they have not fully understood" (p. 386) because the right to criticise must be earned by "dwelling with" and "dwelling in" the writer's ideas (Booth, 1979, p. 351, cited in Elbow, 2005, p. 389).

Booth's position echoes psychologist Carl Rogers' (1961) ideas about empathic understanding—understanding *with* rather than *about* a person. Real communication occurs, Rogers argues, when we avoid our very human tendency to judge long enough to attempt genuine understanding of what someone is saying (i.e. to see ideas and attitudes from the writer's vantage point *and* sense how they feel to him/her).

Both Rogers and Booth advocate a method of active listening incorporating paraphrase, in which we speak up for our own view only after we have first restated our interlocutor's ideas and feelings to the latter's satisfaction, as illustrated in the extended extract from Booth (2005, p. 387) on page 23:

ABOUT THE AUTHOR



Assoc Prof Sunita Abraham's teaching interests lie primarily in the areas of discourse analysis, the language of persuasion, the discourse of argumentation, with particular emphasis on the development of critical reading, writing and thinking abilities. She has received eleven teaching awards at faculty and university levels, including two Outstanding Educator Awards (2000, 2007).

Table 1. Example of a classroom scenario in which students engage in an active listening exercise incorporating paraphrase. (Booth, 2005).

Teacher:	"OK, Ken, you've heard Marna. Can you now summarize her position in a way that you think she will recognize as what she really wanted to say?"
	Ken tries.
Teacher:	"OK, Marna, is that what you were trying to say?" Marna will usually answer, "Hell, no."
Teacher (addressing whole class):	"Do you think that was what Marna was trying to say?" Wild discussion, if things are going well. After a bit:
Teacher:	"OK, Ken, try again. Don't just think about the words Marna used but the whole purpose producing those words, and the method of argument she is relying on or implying, and the fundamental assumptions about argument, or about life itself, that you think she is tacitly relying on."
	After Ken's second try, [Teacher] turn[s] to Marna again. "Has he understood you?" If she says no, ask her why not. After she answers, ask Ken if he understands her objection. And so on.
	Once Ken has convinced Marna that he has actually listened to her well enough to serve as her lawyer in a courtroom, even though he may still disagree with her, [Teacher] turn[s] to Marna and get[s] her to attempt making Kim's [sic] case in the same way.

Writing professor Peter Elbow (2005) recommends a slightly different route to help students inhabit others' ideas (i.e. alternating between extremes of doubt and belief in what he dubs the doubting and believing games, respectively). As a *Doubter*, the reader's role is to be wholly skeptical of a writer's claims, to look for counter-examples and inconsistencies that weaken the writer's case—something that we routinely encourage our students to do. Conversely, as a *Believer*, the reader's role is to try and see things from the writer's frame of reference, even if you disagree with what is being said.

One strategy that Ramage, Bean and Johnson (2010) recommend for reading as a believer is summary writing, using both *says* statements

and *does* statements. *Says* statements summarise the content or main idea of a paragraph or section of text. This is the kind of summary that students are familiar with from their high school training. In contrast, *does* statements summarise the function of a paragraph (i.e. the rhetorical action performed by a writer), as illustrated below:

Para. 1: Uses an anecdote to introduce the problem of ...

Para. 2: Frames the problem of ... in the larger context of...

Para. 3: Sketches two common opposing views to...

Para. 4: Uses statistics to refute the first view.

Recommended Citation

Abraham, S.A. (2013). Critical reading and the rhetoric of critical assent. *CDTL Brief*, 16(1), pp. 22-24.

The two kinds of summaries map onto the skills of comprehension (understanding the text's message) and analysis (understanding the text's rhetorical construction) integral to critical reading.

Three other strategies that Elbow (2005) recommends for reading as a believer include storytelling and image-making, reading aloud, and non-adversarial argument. The first strategy rests on the assumption that whereas the doubting game thrives on the detachment of propositional logic, the believing game thrives on our ability to imaginatively experience things by means of narrative and metaphor. Thus, when students have trouble entering a new and alien view, Elbow (2005) asks them to "tell a story of events that might have led people to have this view of the world" or to imagine what it would be like "to be someone who sees things this way" (p. 394).

The second strategy literally gives voice to the writer's voice in that students are asked to read central passages out loud in class because reading aloud necessitates putting yourself into the words and "creating an actual (if implied) interpretation" (Elbow 2005, p. 397). To make a class discussion even more fruitful, Elbow recommends starting with contrasting "live interpretations" of a key passage so that students can hear and be drawn into these alternative in-dwellings of the author's ideas.

Elbow's third strategy (practising non-adversarial argument) is based on a distinction between agonistic and non-agonistic modes of argument. Classical argument typically involves refutation of opposing views in a zero-sum game (if I am right, you must be wrong) which can result in a 'win-lose' (winner takes all) notion of argument. In contrast, non-adversarial argument is a non-zero-sum game which acknowledges that "two ideas or views

that appear to be in conflict or even logically contradictory *might*, in fact, both be right. ... [if] articulated better or seen from a larger view or in a different frame of reference that the parties haven't yet figured out" (Elbow, 2005, p. 397, italics in original).

Neither Booth nor Elbow reference the philosopher Georg Hegel (who was behind the development of dialectics), but the similarity to dialectical reasoning is apparent in the progression from believing an idea (Elbow's believing game; Hegel's thesis) to inevitably doubting it (Elbow's doubting game; Hegel's antithesis) to the sophistication of a more holistic or integrated perspective (Booth's critical assent; Hegel's synthesis). As both Elbow (2005) and Booth (2005) emphasise, the attempt to build bridges or seek common ground does not signify blind faith or surrender. The goal here is to break the monopoly of extremes, whether of skepticism or dogmatism, by keeping the forces of assent and dissent in dynamic equilibrium. The rhetoric of critical assent reminds us that there are two questions central to rhetoric. Too many people consider only the first: "How can *I* change *your* mind?" forgetting the second and much tougher question: "When should I assent to your view, thus changing *my* mind?"

References

- Booth, W.C. (2005). Blind skepticism versus a rhetoric of assent. *College English*, 67(4), pp. 378–388.
- Elbow, P. (2005). Bringing the rhetoric of assent and the believing game together—and into the classroom. *College English*, 67(4), pp. 388–399.
- Ramage, J., Bean, J. & Johnson, J. (2010). *Writing Arguments: A Rhetoric with Readings* (8th ed.). New York: Longman.
- Rogers, C. (1961). Communication: Its blocking and its facilitation. *On Becoming A Person* (pp. 27–34). New York: Houghton. ■

Developing Students' Questioning Minds by Guiding Them to Critique Published Papers

Dr Zhang Chun

Dept of Physics

When it comes to measuring how successful a scientist can be in research, it is often determined by how sharp his questioning mind is rather than how much knowledge he has. Consequently, to develop questioning minds capable of critical thinking is a major goal of university teaching, especially for students who major in the sciences. The module CM3296 “Molecular Modeling: Theory and Practice” provides some unique opportunities for this, since it is aimed at describing any recent progress made in computational nanoscience, one of the fastest developing fields in science, in which a lot of important problems still remain unsolved.

Designing the Teaching Experiment

In the final homework assignment for CM3296, students were given two papers published in top journals of computational physics, which they had to critique. One paper contained serious errors made through the violation of some basic principles which had been discussed in class. Another paper had some problems in terms of the assumptions it made, but was still

an excellent paper which made an important original contribution to theoretical nanoscience. For this assignment, students were divided into several groups. Each group was required to give a presentation in class to comment on these two papers.

Aims of the Experiment

At the end of the experiment, it is hoped that students will be able to:

1. **Critically evaluate published papers, even those from top-tiered journals, instead of blindly trusting them.** Even papers published in such journals can be wrong. In fact, many important contributions in research were made via a critique of existing and well-accepted theories.
2. **Develop an awareness that a researcher should have the courage to make mistakes, especially when he is doing something absolutely new.** A paper with some mistakes may still be an excellent paper, and some great discoveries have originated from mistakes.

ABOUT THE AUTHOR

Dr Zhang Chun currently teaches both physics and chemistry modules. He finds that introducing one's own research into teaching is very helpful in stimulating students' interest in the subject. In the context of current research, he feels that using such an approach also makes it easier for students to understand some abstract concepts.



DEVELOPING STUDENTS' QUESTIONING MINDS BY GUIDING THEM TO CRITIQUE PUBLISHED PAPERS ... continued from pg 25

Implementation of the Experiment & Problems Encountered

Students were given two weeks to read the papers and prepare their presentations. Each group was given 15 minutes to present, and their presentations were graded immediately after that. Since the other groups were listening while one group made their presentation, I only gave comments after all the groups have made their presentations.

I noticed some problems when it came to the implementation. First, one or two groups modified their PowerPoint slides after listening to their classmates' presentations. Second, there was no question-and-answer session to discuss the presentations, since I only gave comments at the end. The implementation can be improved in future by letting other groups wait outside the classroom when one group is presenting. Of course, the current implementation is only applicable to small classes. For large classes, writing reports may be more effective as assignments instead of presentations, especially when it comes to grading.

Student Feedback for the Experiment

Clearly, students liked the experiment. Some of them were really surprised by the mistakes they found in the published papers. One student commented that the current publishing system must have severe problems for such mistakes to occur. Some others expressed their interest in working in computational nanoscience in future as they found this field interesting, and they gained more confidence after finding out that even papers from top-tiered journals are not immune to making 'silly' mistakes.

In summary, based on the feedback from students, giving students the opportunity to critique published papers through this exercise seems to encourage them to develop questioning minds, foster an interest in the subject, and gain more confidence in research. ■

Recommended Citation

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