As we head full swing into Semester 2, we see more faculty heeding Provost Prof Tan Eng Chye’s call “to build our own technology-enhanced education culture on campus” (Tan, 2013). Whether it is using the IVLE to engage students or developing open online courses so more students can gain access to desired modules, it is evident that more educators are incorporating technology into their teaching.

However, it does not mean that these technologies are being adapted wholesale for their own sake. If anything, educators are mindful that however innovative such technologies are, how they are adopted in the syllabus ultimately depends on one’s teaching objectives and goals. This is a point shared by the authors featured this issue, including our 2013 Outstanding Educator Award winners Assoc Profs Johan Geertsema (University Scholars Programme) and Willie Tan (Dept of Building) as they reflect on the impact of technology on the educator’s role (p.2) and the basics of effective teaching (p. 19). This is also addressed by other colleagues featured in this issue, discussing the diverse ways in which they adopt the flipped classroom approach in their courses, which gives them the chance to “maximise student learning opportunities in the classroom by deliberately shifting direct instruction to outside of the group learning space” (Hamdan, McKnight, McKnight & Arfstrom, 2013, p.6).

With the instructional and more theoretical portions of their lectures moved to video and online platforms, they could now use lecture time in different ways “to work through problems, advance concepts and engage in collaborative learning” (Tucker, 2012). For example, besides using the lecture to discuss and clarify key points, Prof Chi-Hwa Wang and Dr Praveen Linga (Dept of Chemical & Biomolecular Engineering) invited an industry practitioner to be a guest lecturer, providing students with valuable insight into the role of heat exchangers in process industries (p. 4). Similarly, Dr Alberto Corrias (Dept of Biomedical Engineering) and Dr Ong Pei Shi (Dept of Pharmacy) used lecture time as opportunities for students to participate in activities that challenged their higher cognitive abilities, whether it is applying the mathematical theories covered in the videos to solve a specific problem (p. 10) or being able to identify a drug-related problem in a case scenario based on concepts gleaned from e-modules (p. 14).

References


In his 2012 State of the University Address NUS President Professor Tan Chorh Chuan made reference to the “campus tsunami” that followed the launch of edX and Coursera, pointing to their incredible growth in a very short time. Coursera and edX are MOOC (Massive Open Online Courses) platforms, which make available to anyone for free—at least for the moment—courses taught by top professors at top institutions. MOOCs have the potential to increase access and strengthen teaching and learning; they hold great promise not only for people in remote parts of the world, where there may not be universities, or for people with disabilities who may not be able to attend university, but also have the potential to transform teaching on campus itself, for instance by providing rich content to students out of class time. This could help open up more time in classrooms to attend to hands-on work, the basis of the so-called “flipped classroom.”

But the “campus tsunami” does not merely refer to MOOCs. With the launch of Apple’s iPad in 2010—and subsequently tablet computers from other manufacturers—following the success of touch-screen enabled smartphones, a huge number of apps have become readily available, many of them free. The mobility of these devices and the rich array of apps available are changing the ways students and professors are interacting, their relation to knowledge production, and classroom dynamics.

How do we as teachers respond to these waves of digital technologies? How can we best draw on technological developments to teach our students well, to move from an emphasis on knowledge transmission—important though that is—to providing a foundation for students to learn independently? These are important questions as we are moving, seemingly inevitably, towards ever-greater use of technology in teaching.

I of course realize that there can be no single “role” for all teachers, and technology is as old as civilization itself. When it comes to information technology one useful model for thinking about the changing role of the teacher is Ruben R. Puentedura’s SAMR model, which takes its name from the different ways technology can feature in teaching and learning: Substitution, Augmentation, Modification, and Redefinition. The SAMR model implies a hierarchy: the idea is that each step is better than the previous in that it makes teaching more student-centric. But my own view is that we need not see these as stages in a narrative of improvement and progression. How one uses technology in teaching must depend, I think, on one’s learning objectives, what one wants to achieve as a teacher, and thereby of course by how one sees one’s role as teacher in the first place.

A helpful way for considering the role of the teacher is Pratt and Collins’ Teaching Perspectives Inventory (TPI), which identifies five common perspectives teachers have about their role. There is a self-administered questionnaire one can take to get a sense of one’s priorities as a teacher, and also whether one’s practices accord with one’s principles. In my own case, of the five perspectives

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the Developmental role is dominant, with Social Reform and Apprenticeship prominent, and they thus determine how I think about my use of technology. The dominance of the Developmental role suggests, for instance, that I see eliciting understanding through questioning as important; it is to strengthen this that I use iPads and Apple TV in my classes. Apprenticeship relates to a central aspect of my role as a teacher, namely to help equip students with the ability to write well and think critically. Social Reform, which emphasizes critical thinking about social issues, implies that the technology used should not make the teacher disappear. Indeed, the role of the teacher becomes even more important when we use technology, for it brings with it not only opportunities but also dangers.

We need our students to be “net smart,” as Howard Rheingold puts it in his recent book. This must involve, among other things, teaching students that “awareness of your digital footprints and impacts of your digital profiles ought to precede your conscious participation online. Think before you post, because your digital actions are findable, reproducible, and available to people you don't know, and will remain available to all indefinitely” (p. 249). Sherry Turkle, in her recent ethnographic study *Alone Together*, highlights the increased anxiety of the young people she interviews, which she relates back directly to the effects of social media, and digital technology more broadly. Turkle worries that such anxiety could lead to self-policing and thereby, paradoxically, less critical thinking (see p. 256).

From my perspective, part of our role as teachers must then involve being attentive to the dangers of information technology. Our role cannot simply be to celebrate its manifold opportunities, but we need to equip our students also with the means—what Rheingold, among others, terms digital literacies (see pp. 246-252)—of equipping them to interact responsibly with technology. If we are to use technical devices, then at the same time we must deny them the right to dominate us.

**Endnote**

This reflection on technology and its impact on the educator’s role was delivered as part of the Outstanding Educator Awards (OEA) Public Lecture series on 30 April 2013.

**References**


**About the Author**

Assoc Prof Johan Geertsema teaches in the University Scholars Programme, where he coordinates the Writing and Critical Thinking Programme. He believes that technology provides a number of affordances for enhancing active learning, but that it should be used responsibly and with a critical attitude.
Flipped Class Learning in a Large Class Setting

Praveen LINGA & Chi-Hwa WANG
Dept of Chemical & Biomolecular Engineering

Introduction

With the advancement of technology over the past two decades, there has been a myriad of pedagogical advancements and evolving methods for teaching in universities/schools. One noticeable method that is gaining influence is “flipped learning”, in which “teachers shift direct learning out of the large group learning space and move it into the individual learning space with the help of one of several technologies” (Hamdan, McKnight, Mc Knight & Arfstrom, 2013, p. 2). This approach “allows instructors to include active learning elements without sacrificing course content” (Zappe, Leicht, Messner, Litzinger & Lee, 2009). For instance, the lecturer may prepare short videos in advance to deliver the content and students are expected to have gone through the videos beforehand so that they can come prepared to work through the problems and interact with the lecturer during the lecture itself, thus inculcating meaningful discussion rather than involving the lecture time for content delivery.

While there are several positives to this method, the success of this approach also depends on the class size and the teaching methods employed. Last but not least, student participation in this approach is very important in order to achieve the relevant learning outcomes. We introduced flipped learning in a section of the module CN2125 “Heat and Mass Transfer” which has a large class setting (Total enrolment: 280 students) and in this study, we present the survey results solicited through the voluntary participation of chemical and biomolecular engineering (ChBE) students taking the module.

Methodology

Two 45-minute lectures on the subject of heat exchange equipment were recorded before the target delivery day at the NUS Computer Centre’s auditorium during normal teaching hours. Students were informed via e-mail to view the video clip, which had been uploaded to the IVLE (the university’s in-house course management system) before the lecture. Since students would be coming for the lecture prepared, this regular lecture time slot was converted to an open discussion on the lecture materials together with a guest lecture by an industry practitioner who will address practical aspects of heat exchangers. During the session, the guest lecturer offered students a wider scope of the practical problems one would encounter in Singapore’s chemical industry and a review of various types of heat exchangers it uses. After the flipped class, the evaluation of its impact on student performance was measured through the homework assignment and final examination. Students were also requested to provide online feedback (qualitative and quantitative) three weeks after the completion of the flipped class.

Recommended Citation

Using Pre-recorded Video Lectures to Explain the Basics of Heat Transfer Equipment

This video lecture covered the fundamental aspects of heat exchangers, including the classifications of different types of heat exchangers, such as double-pipe heat exchangers, shell-and-tube heat exchangers, and the cross-flow heat exchanger. In the video, students were taken through derivations of the term “log-mean temperature difference”. The video also introduced the energy balance concepts for “co-current flow” and “counter-current flow” heat exchangers together with case studies that offered specific examples. Students were requested to use the standard chart of correction factors for cross flow and shell-and-tube heat exchangers (for benchmarking against the counter-current configuration heat exchangers) to determine the actual heat transfer areas required in the process.

Using the Actual Lecture for Discussion & Clarification

After doing the required preparation and self-study using the video lectures, the students joined the discussion session in the lecture theatre during normal teaching hours. The lecturer-in-charge began the flipped class with a brief summary of the content covered in the video lecture. He then took a few questions from the students regarding how the lecture would be conducted and also how student performance would be evaluated in these sessions. Since the students had completed the review of the video lecture, the official teaching hours could be shortened without compromising the quality of teaching. The lecturer used the time saved as an “opportunity to maximise [their] students’ learning opportunities in the classroom” (Hamdan et al., 2013, p. 6) by getting a practitioner from the industry to conduct a guest lecture, which was usually not possible under the normal curriculum.

Including a Guest Lecture by An Industry Practitioner

The second half of the flipped class was dedicated to a guest lecture given by an industry practitioner. The speaker, Mr. Nagaraj Tumma (Chevron Oronite Pte Ltd, Singapore), delivered a lecture entitled “Heat Exchanger Fundamentals”. His lecture covered subjects such as the role of heat exchangers in process industries, design considerations, thermal and hydraulic designs, fouling and monitoring, mechanical design considerations, and maintenance. These topics were a good complement to the basic information provided in the pre-recorded video lecture and also gave students invaluable opportunities to understand the applications of heat exchangers in practical process industries.

Evaluations of Student Performance

As part of the continual assessments, the concepts covered in the flipped class were tested in the follow-up homework assignment and final examination. For instance, one concept question was assigned to students as a homework assignment on the choice of heat exchangers and the required heat transfer areas:

“A shell-and-tube heat exchanger having one shell pass and eight tube passes is to heat kerosene from 80 to 130 °F. The kerosene enters at a rate of 2500 lbm/hr. Water, entering at 200 °F and a rate of 900 lbm/hr, is to flow on the shell side. The overall heat-transfer coefficient is 260 Btu/hr ft² °F. Determine the required heat-transfer area.”

At the end of semester, one more structured question was given in the final examination for the students to calculate the heat transfer coefficients associated with the condenser of a power plant, focusing on the heat transfer between the water and the tubes, and the number of tubes needed to achieve the indicated heat transfer coefficients.
transfer rate. Judging from the results obtained for these two sampling points of evaluation, students were doing relatively well on this topic under this new approach. Their academic performance was just as good as that of earlier cohorts of ChBE students taught by the same lecturer in the past three years, even though the formal teaching hours for this cohort have been reduced.

### Survey Questions

Following the flipped class, the lecturers for CN2125 prepared a survey form to collect qualitative and quantitative feedback from the students. The following questions were designed for that purpose:

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is flip class learning appropriate for large class (&gt;250 students)?</td>
<td>Multiple choice</td>
</tr>
<tr>
<td>2. Flip class learning increased my workload.</td>
<td>Likert scale</td>
</tr>
<tr>
<td>3. Do you think flip class learning should be experimented in other modules?</td>
<td>Multiple choice</td>
</tr>
<tr>
<td>4. Comments, if any?</td>
<td>Essay</td>
</tr>
</tbody>
</table>

### Survey Results

Figure 1 shows the survey results for Q1. The sample size for the data presented is 144 students which is about 50.7% of the class (total class size: 284 students). As can be seen from the students’ response, about half the respondents think that flipped class learning can be implemented for a large class setting and it is quite appropriate albeit a bit challenging to engage a large class. It is noted that only about a sixth of the respondents said “No”, while about 30% of the respondents were “fence sitters” leaning towards the positive aspect of the question. This is an encouraging sign from the students’ perspective, that they are able to adapt to new pedagogies and approaches to teaching/learning.

![Figure 1. Students’ response to Q1 “Is flipped class learning appropriate for a large class (>250 students)?”](image)
Figure 2 shows the survey results for Q2. This is an interesting question as it directly addresses students’ perceptions towards the workload aspect of the flipped class learning initiative. The students’ response shown in Figure 2 indicate that about 38.2% of the respondents think that flipped class learning increased their workload while the majority (43.1%) remained neutral, indicating that this initiative neither increased nor decreased their workload. It is also interesting to note that none of the respondents strongly disagreed while a small number of respondents (3.5%) strongly agreed. One student decided to skip this question and is duly represented under “Skip” in Figure 2.

Figure 3. Students’ response to Q3 “Do you think flipped class should be experimented in other modules?”

continued on the next page...
The third survey question was quite general; we wanted to gauge students’ acceptance levels to new and bold teaching/learning initiatives and we designed Q3 with that in mind. Figure 3 shows students’ response to Q3. 48.6% of the respondents chose “Yes” for this question, meaning that they were appreciative of new teaching/learning techniques in spite of the fact that 40% of the respondents had agreed in Q2 that the flipped class learning increased their workload. This is an encouraging sign for faculty members wanting to implement flipped class learning in a large class set-up, a typical situation for undergraduate level modules in many departments here at the NUS and may be applicable to many other universities as well. It is also interesting to note that only about 17.4% of the respondents said that flipped class learning should not be experimented while about one third chose to sit on the fence (“Maybe”) but leaning towards a positive response.

Apart from the three questions (Q1, Q2 and Q3) that were based on multiple choice and the Likert scale, the rest of the survey responses consisted of qualitative comments from the students about this initiative. After analysing the comments we realised that among the comments which were directly relevant to the flipped class learning approach, about 90% of them focused on the positive aspects while about 10% of the comments focused on the negative aspects. We have highlighted a few examples to give the readers a perspective of the comments we received on this initiative:

### Positive aspects

- “Good initiative. [This] should be done more often. As university students, we are expected to do a tad bit of self-learning. With flip flop lectures, this opportunity is given to us.”
- “It is an interesting initiative and might open up new possibilities in the current education system.”
- “This is a good change. A change in the lecture style [gives] students a change in the learning environment.”

### Negative aspects

- “I feel that this type of learning is more appropriate for small group.”
Conclusions

Our initiative to experiment using flipped class learning for one session in CN2125 has been a learning curve for us (the instructors) and it has received positive feedback from the students. The survey results show strong indications of students being appreciative of such new pedagogical initiatives being implemented, even though about 40% of them surveyed stated that it has increased their workload. In addition, there is a strong indication in the survey results that students would welcome such new learning approaches being implemented in future.

Acknowledgements

The authors thank Mr. Nagaraj Tumma (from Chevron Oronite Pte Ltd, Singapore) for his invaluable contribution to the 2013 industry guest lecture in CN2125 “Heat and Mass Transfer”. The authors would also like to express their appreciation to Professors Jim Yang Lee and G.P. Rangaiah for their suggestions regarding the adoption and execution of the flipped class for this teaching assignment.

References


About the Authors

Professor Chi-Hwa Wang currently teaches the following three modules in the Dept of Chemical & Biomolecular Engineering: CN2125 and CN2125E “Heat & Mass Transfer” and CN3124E “Particle Technology”. He believes that large student-lecturer ratio makes it extremely difficult for effective class interactions on an individual basis. In order to achieve this objective, he feels that teaching materials and methodologies have to be updated and enhanced regularly based on the state-of-the-art Internet and IT (e.g. webcast) facilities.

Dr. Praveen Linga currently co-teaches an undergraduate module, CN2125 “Heat & Mass Transfer” and a graduate module, CN5192 “Future Fuel Options: Prospects & Technologies”. He believes that teaching at the University level is to entrust students with the tools for obtaining knowledge, and to show them the relevance of such knowledge, thereby inspiring them to actively seek out further directions.
Lightening Up Mathematics-intensive Classes: A Case Study Using A Flipped Classroom Approach

Alberto CORRIAS
Dept of Biomedical Engineering

Introduction

The application of mathematical theory to real life problems is at the core of an engineer’s skill set. As a consequence, any Engineering curriculum involves several courses where a certain set of mathematics concepts are explained to the students. Engineering students should typically share an appreciation for or at least an inclination towards mathematics. Nevertheless, it is the application of mathematics, rather than the mathematical theory itself, that actually sparks an Engineering student’s interest. For this reason, some of the most theoretical classes often end up perceived as being rather dry and, taken in isolation, quite uninspiring. According to Chen (2010), as part of a social constructivist approach to learning,

“…learning occurs when students socially build and agree upon knowledge. By exchanging and sharing notions with others, knowledge is formed and thinking occurs” (p.26).

Hence, in order to enhance student engagement, I decided to implement a flipped classroom concept, incorporating participation incentives for the students. The key underlying idea of this case study is to cover the most theoretical topics in pre-recorded video lectures while focusing on specific applications of the theory during the classroom sessions with some level of interaction with them.

Implementation Details

This experiment was conducted in a large undergraduate class (145 students in total). The topic of the course was data analysis. Following a paradigm that is similar to that of the flipped classroom (Hamdan, McKnight, McKnight & Arfstrom, 2013), I pre-recorded the video lectures and made them available to the students a week before the classroom sessions. The video lectures were typically 20 to 30 minutes long. The content covered the most theoretical and mathematical aspects of the topics in the syllabus. The fact that the most theoretical topics were covered in the video lectures allowed me to use the classroom sessions to focus my students’ attention on the applications of the theory. In fact, each classroom session started with a problem taken from scientific literature in the relevant field (bioengineering) and consisted of getting students to apply the theory covered in the video lecture to the specific problem.

Students were encouraged to view the video lecture before the classroom session, which falls on a Tuesday. Email reminders were sent to them regularly. To promote student participation in the classroom session, I asked the class several questions throughout the lecture. At least 5 questions per classroom session were asked, often more. Students who watched the video lectures beforehand should be able to answer the questions easily. After asking the question,
I would do a visual sweep of the lecture theatre to spot the first student who raised his/her hand and listened to the answer. For every correct answer I gave a small prize; typically, a chocolate bar.

I emphasised to the class many times that there was no penalty for wrong answers, and that one student can answer multiple times, even after getting an earlier question wrong. In addition, I emphasised that the answers they give in class will not have any effect on their overall grades.

**Methods of Assessment & Results**

The efficacy of the proposed strategy was assessed by two independent methods: a survey and a focus group discussion with the students, two of the most commonly used methods (Cousin, 2009).

**Survey**

A questionnaire was distributed to the students during the last lecture of the term. The questionnaire consisted of the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Description</th>
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<tbody>
<tr>
<td>Statement 1:</td>
<td>“I found the video lectures useful.”</td>
</tr>
<tr>
<td>Statement 2:</td>
<td>“I would have preferred a traditional lecture + tutorial format without any video lecture.”</td>
</tr>
<tr>
<td>Statement 3:</td>
<td>“Because of the video lectures, the lectures on Tuesday were useless: that time could be better invested practising on computers.”</td>
</tr>
</tbody>
</table>

The reference to practising on computers in Statement 3 is related to the tutorial session that followed the Tuesday lecture the next day. Students were asked about their level of agreement in a 5-point scale (i.e., 1-Strongly disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly agree). An open box for comments and suggestions was included as well. 107 students (74% of the class) responded to the questionnaire.

**About the Author**

**Dr Alberto Corrias** currently teaches several modules related to computing, statistics, design and modelling to biomedical engineering students. He also teaches a junior seminar course on biomedical technology to the students of the College of Alice and Peter Tan (University Town). He believes that a judicious use of new technologies can have a significant and positive impact on students’ learning of engineering subjects.
According to the survey results shown in Figure 1, when asked whether they found the video lectures useful, none of the students disagreed and only 5% were neutral about it, providing a strong indication that the video lectures were appreciated by most of the class. Nevertheless, when asked whether they would prefer a traditional classroom concept as opposed to the presence of video lectures, a sizable proportion of students (34.9%) gave a ‘neutral’ answer and only 50.5% agreed or strongly agreed.

Only 13.5% of students thought that the classroom session on Tuesday was no longer useful because of the video lectures, suggesting that the interplay between video lectures and the classroom session was well received.

**Focus Group Discussion**

Five (5) students were randomly selected for a focus group discussion. The objective of the discussion was to substantiate the results of the survey and gather more feedback and ideas from the students. It was conducted about six weeks after the end of the term. The first topic of the discussion was the video lectures. Four out of five students watched the video lectures (one student missed a couple). They all agreed that the ability to rewind and “re-listen” to the videos was critical to their learning and most appreciated having these videos on hand because as one student put it, in a normal classroom, at some point “my mind goes somewhere and I miss what the lecturer says”. The length of the video was deemed appropriate by all students. Two students watched the video before the actual lecture throughout the course (as recommended). Two other students said that sometimes they would watch it afterwards or in some cases, just before the exam.

The second topic of the discussion was the classroom session. All the students in the focus group agreed that the presence of video lectures was not a factor in their decision whether to

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*Note: Statements 2 and 3 and their respective responses have been rephrased in a positive way in Figure 1, e.g., the green column for Statement 2 represents the number of students who disagreed with “I would have preferred a traditional lecture + tutorial format without any video lecture.”*
attend the classroom session or not. In fact, they all attended the classroom sessions. They agreed that the focus on the application side of the problem—made possible by the presence of the video lectures—was useful. They all enjoyed the rewards system (chocolate bars) and explicitly encouraged me to maintain it next year. They also suggested limiting the number of answers any one student is allowed to give.

**Reflections & Future Directions**

Implementing the flipped classroom concept required considerable extra work, such as additional time to record and edit the video lectures. Nevertheless, I believe it was well worth the effort. The positive survey results were encouraging and with the flipped classroom approach, the classroom sessions turned out to be livelier than I expected given the topic and the size of the class. The system of participation incentives worked well, and I managed to obtain answers for all the questions I have asked in class throughout the course. The focus group discussion essentially confirmed the survey results—that the video lectures were considered valuable by the students, particularly because of the added capability listening to certain parts of the lecture multiple times. It would be interesting to collect more data from future runs of this course to confirm and validate what is presented here. For example, one plan could be to incorporate some online quizzes for students to attempt right after viewing the online lectures. It is hoped that such quizzes may provide prompt feedback to students, a way to check on their level of understanding after viewing the lectures. Furthermore, it would be interesting to quantify the impact of the proposed approach on students’ learning; such a task could be achieved by comparing the performance of students who watched the video lectures with students who, perhaps choosing a self-study approach, did not watch the video lectures.

**Endnote**

This case study was presented at the Technology-enhanced Learning 2013 (TEL2013) Symposium on 7 Oct 2013.

**References**


A Hybrid Teaching Method Encompassing Didactic Lectures, Short E-modules & Case Scenarios to Facilitate Learning of Pharmaceutical Care Principles

ONG Pei Shi
Dept of Pharmacy

Introduction

Pharmaceutical care (PC) is a new academic discipline within pharmacy practice. It focuses on the paradigm shift in the role of pharmacist from product-oriented dispensing to patient-centred care, with an emphasis on solving drug-related problems for the achievement of predefined clinical outcomes (Helper & Strand, 1990). In line with the practice of PC, several concepts including the philosophy of PC, the components of PC, principles of drug-related problems, PC cycle and PC practice requirements need to be well understood by the practitioner for successful patient care. As part of the introductory course to the pharmacy profession, (PR1103 “Pharmacy Practice I”), Year 1 pharmacy students are introduced to the principles of PC in their first semester of study. This is to allow them to develop an appreciation of the emerging role of the pharmacist in today’s healthcare continuum.

Traditionally, the principles of PC were taught as two didactic lectures in PR1103, with a heavy focus on the concepts and philosophy involved. Further concept illustration using actual case scenarios was limited due to the following reasons:

• students lacking the required therapeutic and pharmacology foundation knowledge at this stage of their course (i.e. Year 1 first semester), and

• limited amount of time allocated for this topic within the module.

As a consequence, many students had given feedback that this subject was boring, yawn-inducing, too theoretical and difficult to learn.

The New Teaching Model

Method

In order to facilitate students’ interest in PC principles and improve the quality of their learning, a new hybrid teaching method encompassing didactic lectures, short e-learning modules (e-modules) and interactive case scenarios was adopted for two cohorts of students (n=344) from Academic Years 2011/12 to 2012/13. This new model embraced the...

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concept of a flipped classroom (Berrett, 2012; Brame, 2012). In her article, Brame defines this learning approach succinctly,

In essence, “flipping the classroom” means that students gain first exposure to new material outside of the class, usually via reading or lecture videos, and then use class time to do the harder work of assimilating that knowledge, perhaps through problem-solving, discussion or debates. (p.1)

With this approach in mind, I divided the module’s syllabus into five parts:

| i. | Didactic Lecture 1 |
| ii. | Three short e-modules |
| iii. | Case scenarios |
| iv. | Didactic Lecture 2 |
| v. | Survey on the hybrid teaching method |

The first part comprised of Didactic Lecture 1 whereby students were introduced to the philosophy of PC, the components of PC and drug-related problems. The second part required students to read three short e-modules, each focusing on one of three commonly encountered chronic disease conditions, namely high blood pressure, chest pain and diabetes. It outlined the etiology, diagnosis and management of the disease condition of interest. All contents were in simplified layman language that did not require any prior therapeutic and pharmacology knowledge. Each e-module was approximately fifteen minutes long and was presented as an Adobe Breeze presentation with accompanying audio recording. Students were provided the links to the e-modules which they can download and read at their convenience. A key element of the flipped classroom approach is applied here, since the provision of e-modules in the syllabus gives students the chance to gain “first exposure to new materials outside of class” (Brame, 2012, p.1)

After reading the e-modules, students were asked in part three of this learning model to attempt four short case scenarios. Each case scenario depicted drug-related problems that were frequently encountered by patients with the chronic diseases described in the e-modules. As an application of what they have learnt in Lecture 1 and the three e-modules, students were required to identify the appropriate drug-related problems portrayed in each of the case scenarios. These tasks that they have to complete reflect another key element of the flipped classroom approach which Brame outlines in her article—the importance of providing a mechanism to assess student understanding (i.e. being able to identify drug-related problems in the case scenarios). This self-directed learning of both e-modules and case scenarios were to be completed before the next didactic lecture.

In part four (Didactic Lecture 2), an interactive discussion of the case scenarios was first carried out. For this class, students were randomly called upon to discuss the solution to each case scenario and any question or disagreement was promptly clarified. This was followed by instructor-led teaching of concepts on developing a PC plan and its illustration using a case study based on the information found in the e-modules. The provision of learning activities during the lecture which focus on higher level cognitive activities (i.e. discussion, clarification and critical analysis of case scenarios) is another example of the flipped classroom approach being applied in the syllabus. Lastly, students were surveyed on their perception of the effectiveness of this hybrid teaching method immediately after Lecture 2.

continued on the next page ...
Survey Findings

In total, 87.2% of students responded to the survey, administered immediately following the implementation of this new instructional method. As a whole, this hybrid teaching method was well received by the students. The majority of respondents (> 90.0%) preferred this hybrid teaching method over conventional teaching using didactic lectures alone. The success of this new teaching model was also reflected in the qualitative feedback, which were gathered from the survey itself as well as the end-of-semester teaching evaluation exercise. These findings will be discussed in greater detail in the following paragraphs.

Incorporating E-modules: Improved Students’ Understanding of the Course Content

According to the survey results, more than 90.0% of the respondents found the e-modules interesting (with 75.5% and 11.2% indicating that they “Agree” and “Strongly Agree” respectively) and easy to understand (with 80.4% and 17.5% indicating that they “Agree” and “Strongly Agree” respectively). A similarly positive response was reflected in the qualitative feedback:

- “A very interesting way of teaching.”
- “She created a very interactive environment for us to learn. It made the driest topic become interesting and engaging.”
- “She deserved commendation for her excellent work in making a rather uninteresting module a very interesting and pleasant learning journey for us newly matriculated students, making our Year 1 Semester 1 a pleasant one.”

The respondents also gave feedback that the e-modules improved their understanding of the lecture content, specifically PC principles and concepts such as drug therapy problems (with 82.5% and 12.6% stating that they “Agree” and “Strongly Agree” respectively) and the use of a case scenario to illustrate the importance of developing a sound PC plan (with 82.4% and 14.8% stating that they “Agree” and “Strongly Agree” respectively).

Overall, 86.7% of students were receptive to the use of more e-modules for this purpose. They shared more in the qualitative feedback gathered:

- “The E-modules were informative and provided good background before lecture 2.”
- “Challenging at first but enjoyable as I started to appreciate the case scenarios and link to pharmaceutical care concepts.”
- “The case scenarios were very interesting. More of it [sic] because I can follow the lecture better. I love to learn more about it.”

Using Case Scenarios: Improved Students’ Understanding of PC Concepts & Their Application in Real Life

Students’ response to the use of case scenarios in the syllabus were also positive, based on the data gathered. The majority of respondents indicated that the case scenarios improved their understanding of PC concepts (72.7% and 25.2% stating that they “Agree” and “Strongly Agree” respectively), with up to 95.1% agreeing that the scenarios allowed them to have a glimpse of the application of PC concepts in the real world:

- “Interesting examples used to teach concepts. Case scenarios were helpful in learning as well as to illustrate the importance of some of the abstract concepts.”
• “She engaged in interesting learning method. [She] gave LOADS of relevant examples related to drugs and pharmacy in her lectures which was good since they helped me relate better to how the lecture content can be applied to the real world context.”

Overall, students’ comments from both the post-course survey and the end-of-semester teaching evaluation exercise indicated that they enjoyed this student-centred approach of teaching and appreciated its usefulness in helping them reach the module’s learning objectives; it piqued their interest in learning more about the principles of PC, and the active classroom engagement using the case scenarios led to a better understanding of PC concepts.

• “This teaching method showed us the relevance of what we were learning. I really enjoyed the hybrid [teaching method].”

• “Very useful as it helped to show possible scenarios that we as pharmacists may encounter in the future.”

• “More E-modules and examples on pharmaceutical care scenarios please, they were really useful.”

No overtly negative comments on this hybrid teaching method were received from students, although some suggested the possibility of mounting the e-modules before Lecture 1 should more of these modules be created. This is to allow more time for students to read these e-modules before attending the lectures.

**Conclusion**

In conclusion, a non-traditional hybrid teaching method was successfully employed to facilitate the teaching of difficult concepts to first year undergraduate students. This technology-enabled flipped classroom approach was beneficial to learners as it allowed for the active acquisition of additional factual content outside of routine classroom teaching. It, in turn, acted as a scaffold which facilitated the achievement of higher level cognitive activities and learning outcomes, thereby making the knowledge acquisition journey more rewarding for learners.

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**About the Author**

**Dr Ong Pei Shi** teaches Pharmacy Practice to undergraduates as well as Clinical Pharmacokinetics and Therapeutic Drug Monitoring to PharmD students. She embraces cooperative and active learning approaches in her classes in order to make learning more enduring. By doing so, she also seeks to equip her students with the necessary hard and soft skills to meet the challenges as future pharmacists in an ever changing healthcare environment.
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Endnote

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References


Back to Basics: A Six-step Process to Effective Teaching

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Introduction

The term “back to basics” has many meanings in education, and it is best to start by clearing the confusion. In some countries, it means school reform (Holt, 1996), that is, going back to teaching and learning basic reading, writing, and math. A second meaning is to focus on basic (essential) courses so that students do not graduate from school by taking only “soft” elective courses (Lipsett, 2009). A third meaning, which is often found in the teaching of languages, is the debate between learning by immersion and learning by drills. In the teaching of math, one finds a similar disagreement between “conceptual” learning and drills (Xin, 2012). A fourth meaning, according to Dewey (2012), is the basic question on the goals of education.

In this paper, the term “back to basics” means understanding that teaching is, ultimately, about effective communication.

A Six-step Process

So how does one communicate effectively to students, and therefore motivate them to learn? I suggest a six-step process that begins with a framework that structures the way teaching is perceived. Within this environment, the teacher must have positive traits, a clear understanding of the goals, develop a focused curriculum, have a good understanding of how the material is taught, and be committed to continuous improvement in these areas (see Figure 1).

Environment

Teaching is not carried out in a vacuum. There is an environment that structures the rewards and incentives and enforces them. In a university setting, this implies the place of teaching in promotion and tenure, and the desired level of supervision. Generally, the latter is relatively low because of the high level of trust. The downside is that good teaching, which has been alluded to as a complicated matter, can be compromised.

Traits

To teach well, a teacher must have positive expectations about teaching and learning. Terms such as “passion” and “care for students” are often used, but ultimately, one must hold on to the idea that students can learn and one’s teaching can make a difference.

Goals

What are we trying to achieve in our teaching? There is no ready answer. There are many stakeholders, with possibly conflicting interests. For the society at large, university education involves inculcating community values. Employers want graduates to be “employment-ready” while the universities tend to have different educational goals that can be described as “being modern,” that is, to produce graduates equipped with knowledge and modern values. If the module is a pre-requisite for another module, then these

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receiving teachers require students to have good background knowledge. Finally, students are a heterogeneous lot with diverse goals. Through surveys over the years, I have found that students generally look for delight, usable knowledge, and “understandable-ness” or clarity. The obverse is that they do not want to be taught impractical theories, nor do they want to attend uninspiring and disorganised classes.

From these basic observations, I figured out that my goal for teaching is to provide a strong foundation that will motivate students or spark enthusiasm for lifelong learning, application, and innovation. In my experience, it is not too difficult to spark enthusiasm if the theories being taught are highly applicable, especially in differing multi-disciplinary contexts. The main difficulty is to build on that strong foundation, which is discussed in the next section.

Content

Good curriculum designers know how to write the syllabus in such a way that it allows the teacher some room for interpretation, innovation, and improvement. In my view, the right path is to focus on the core content and leave out the peripherals.

About the Author

Assoc Prof Willie Tan teaches Research Methods, Development Finance, and Green Development. He believes student motivation lies at the heart of good teaching, and it can be achieved by starting with the big picture, clarity of exposition, providing useful knowledge, and developing strong foundations.
How To Teach It

The next step is to figure out how to teach it. In my classes, I use a “conceptual map” to let students see the big picture on how the various parts (e.g. lectures and tutorials) are related. Then I make each part as understandable as possible. Two mechanisms are used: first, I go through the instructional steps and iterate until the content is crystal clear. Second, I try to find the best examples. These two mechanisms are by no means easy to implement; it requires “research”, if by that term we mean looking and relooking at it for a better solution.

Continuous Improvement

Finally, one has to look for ways to continuously improve the above steps (see Figure 1). This also requires self-development, whether its experimenting with or being open to new pedagogies and technologies. It involves spending time to “sharpen the axe” and chop more trees with less effort. Abraham Lincoln said that, given six hours to chop down a tree, he would spend the first four sharpening the axe. In my experience when it comes to effective teaching, this proportion is about right.

Endnote

This reflection on the basics of effective teaching was delivered as part of the Outstanding Educator Awards (OEA) Public Lecture series on 30 April 2013.

References


