My Teaching Philosophy, Approaches, and Effectiveness

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3 December, 2001

ABSTRACT

The main purpose of this paper is to share my teaching philosophy and approaches that have been developed from my eight years of teaching experience with PolyU, and to show how they affect the effectiveness of my teaching. To clearly explain the above, I refer only to my last three years of teaching activities. My teaching philosophy can be best summarized by TIPS: Team-work (with my students), Integrity (as a pre-requisite), Perseverance (for excellence), and Success (in teaching and learning). TIPS has a direct impact on how I approach my students and my teaching. Since I view my students as my partners in teaching, for example, I would always encourage my students to participate in the class discussion and in problem solving, and welcome different opinions. The teacher-student interactions, as well as student-student interactions, are instrumental to equipping students with independent learning and problem solving skills. My integrity as a teaching professional compels me to uphold an uncompromising standard of teaching and assessment. For example, I always concentrate on teaching the fundamentals, and challenge my students to thoroughly understand the subject material. Moreover, I pay attention to my students' integrity when it comes to the assessment and illegal photocopying issues. Perseverance refers to the persistence in keeping the subject material updated and in motivating students. In the latter point, I have tried out different teaching approaches, such as using visual objects to explain difficult concepts in lectures and to "bring networking laboratory" to where the students are. Both my experience and student feedback support that the approaches just described are very effective to enhance students' learning, on both undergraduate and graduate levels.

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I. TEACHING ACTIVITIES IN THE LAST THREE YEARS

My teaching activities in the last three years can be categorized into three areas: (1) Teaching in the Computer Networking discipline on both undergraduate and graduate levels, (2) directing and managing the Industrial Placement program for both BA (Hons) in Computing and BSc (Hons) in Information Technology (the latter program is jointly offered with EIE), and (3) supervised MSc dissertations and final-year projects:

1. COMP312: Computer Communications Networks (136-168 students)
2. COMP526: Internetworking Protocols and Software (28-49 students)
3. COMP555: Internetworking Protocols and Software II (16-36 students)
4. COMP530: Selected Topics in Computer Networks (25 students)
5. COMP400: Industrial Placement Program (114-131 students)
6. COMP591: MSc dissertations (> 10 students)
7. COMP401: Final-Year Projects (> 10 students)

II. ACHIEVEMENT HIGHLIGHTS

1. Students considered my teaching very effective.
   For example,
   - For the three MSc courses, I have consistently obtained very good student feedback through SFQ and my own surveys. Notably, on the question "staff member is an effective teacher," ALL students in COMP526 (98/99) and COMP555 (99/00 and 00/01) replied with either "agree" or "strongly agree." Furthermore, more than 60% of the COMP555 classes replied with "strongly agree." The SFQ scores range between 4.3/5.0 and 4.8/5.0. I have also received very nice comments from MSc students (via emails):
     - ◊ "We have learnt a lot from you and your teaching is effective. We thank for bringing us interested in your subjects and hope that we can attend future subjects from you. Please tell us if you plan to offer lectures other than Protocol I & II. Thanks a lot."
     - ◊ "Thanks for your effort put in the class. It made the course more interesting and effective. See you in Internetworking Protocols and Software II."
     - ◊ "We are going to select course for next semester (semester 2 for 98/99) at early Dec. What networking course will you teach in that semester? Your TCP/IP course is the best course I ever studied in PolyU."
   - For the undergraduate subject COMP312, I have attempted to scale my teaching to large classes (136 and 168) with some success, for example,

	99/00 (136 students)	00/01 (168 students)
1. Staff member's teaching was well-organized.	3.8 (0.6)	3.6 (0.8)
2. Encouraged students to ask questions and discuss ideas.	3.5 (0.5)	3.7 (0.9)
3. Encouraged students to learn independently.	3.6 (0.7)	3.7 (0.9)
4. Studying this subject was very worthwhile.	3.7 (0.6)	3.6 (0.9)

(standard deviation)

Not only the class sizes are different, the academic backgrounds and learning attitude for the 00/01 class are more heterogeneous than that for 99/00. Therefore, the standard deviations are much higher for 00/01, and the SFQ scores are also generally lower for 00/01 except for questions (2) and (3).

2. Students were motivated by my teaching.
   For example,
   - In my own surveys, over 80% and 90% of the MSc students agreed that "they were more interested in Computer Networking" after taking COMP526 and COMP555, respectively. On the undergraduate level, over 60% of the students agreed that "they were more interested in Computer Networking" after taking COMP312.
   - My teaching has apparently attracted a number of students to study under my supervision for their MSc dissertations and final-year projects. I successfully supervised 11 good-quality MSc dissertations (with at least grade B) in the last three years. One project was awarded an A+ grade, and two others with A grade. One project's finding was published in *IEEE Internet Computing* magazine. Moreover, only four MSc students chose the dissertation option in the Department when it was first offered last year; three of the four chose me to be their supervisors. This year I have also undertaken two additional final-year projects on Computer Networks, making a total of 6, and both students received grades A+ and A in COMP312.

3. Students were equipped for independent learning and problem solving skills.
   For example,
   - On the question "Encouraged students to ask questions and discuss ideas," ALL students in COMP526 (98/99) and COMP555 (99/00 and 00/01) replied with either "agree" or "strongly agree." Furthermore, almost 80% of the students in COMP555 (00/01) replied with "strongly agree." The SFQ scores range between 4.4/5.0 and 4.8/5.0. On the question "Encouraged students to learn independently," ALL students in COMP555 (00/01) replied with either "strongly agree" (40%) or "agree" (60%).
   - On the undergraduate level, the SFQ scores for the two questions, as already shown under item 1, range between 3.5/5.0 and 3.7/5.0. The scores are in fact improved for 00/01, in spite of a much bigger class size. Moreover, I am particularly encouraged by the following written feedback from students:
     - ◊ "The course promotes independent thinking rather than memorizing. This is the most special thing throughout the two years of U-life."
     - ◊ "Need to fully understand the materials, not just remember things."

4. Students were challenged to thoroughly understand the subject material.
   For example,
   - For every course I teach, I always challenge students to thoroughly understand the subject as much as possible. This uncompromising demand for thoroughness, however, sometimes give students the impression that they still had not understood the subject material, which is especially true for a large undergraduate class. This is reflected in the relatively low SFQ scores (3.3/4.0 and 2.9/4.0 for COMP312) in the question "able to understand the subject matter."
   - On the other hand, quite a number of students, including working professionals in the field, appreciated for a deepened understanding of the subject material, e.g.,
     - ◊ "The assignment questions help understand the subject material a lot." (from COMP312)
     - ◊ "The assignments help me to consolidate my concept." (from COMP530)
     - ◊ "Open the TCP/IP for me. Confident to tell friends that I understand TCP/IP in details." (from COMP526)

5. Students' learning was enhanced by continuously updated syllabi and new teaching methods.
   For example,
   - After teaching COMP526 for four years, I realized that the subject content had advanced so much that a single graduate course simply could not cover the important development in the field. Therefore, I proposed a sequel subject COMP555 to cover more advanced topics. When this subject was offered for the first time in 99/00, the student feedback was even better than that for COMP526.
   - I tried out a new approach to learning Computer Networks in COMP312 (00/01). The approach is essentially to bring the "networking laboratory" to where the students are, and to let students experiment with a real computer network as the course progresses. Specifically, the students were asked to construct a computer network from scratch and, as the course advances, they could construct more sophisticated computer networks, and they could also test out the networking concepts on their networks. Despite various problems throughout the process, I received some good comments about the project:
     - ◊ "I like the class project on LAN, it is interesting and I've learnt many new things for my own." (from COMP312)
     - ◊ "The practical class project offers good chance to set up network and experience a lot." (from COMP312)

6. Students were taught integrity and professionalism.
   - In the first lecture for my undergraduate classes, among other things, I usually ask students not to photocopy the textbooks, and I also explain the reasons and possible backfire. Moreover, I explicitly warn them that I would report such illegal activities, if discovered, to the appropriate legal authority. As far as I know, I did not discover such cases, because they all needed to bring their textbooks to the open-book final examinations.
   - Besides, I also pay attention to possible plagiarism activities in the coursework. In COMP312 (00/01), for example, I came across plagiarism in one laboratory report, which involved around 20 students (with different "groups"). When confronted, they all admitted to the wrongdoing and agreed to accept the penalty that I spelled out in the first lecture and in the course website.

7. Students' learning was broadened and enhanced by the Industrial Placement program.
   - In cooperation with APC and IASTE, I helped extend the Industrial Placement program to overseas. In 00/01, six students were placed to companies in the USA, Japan, Sweden, and Denmark. In 01/02, another six students were placed to companies in UK, Sweden, Finland, Austria, Germany, and Norway.

- Since I took up the responsibility for the placement program in the summer of 1999, I overhauled the entire process of managing the placement program, e.g., making the system more flexible, providing more help and training to the students, such as, resume-writing and interview workshop, providing timely help to solve problematic cases, and actively advertising the program with a new pamphlet and a new website. Needless to say, the placement companies and all the academic staff from COMP and EIE (for BScIT), who served as supervisors to the placement students, contributed to the success of this program.
- Based on the surveys from the first batch of placement students that I was responsible for (labeled by 00/01 in the table), there is a significant shift from "agree" (inside parentheses) to "strongly agree" in the students' satisfaction about the program. Overall, students are more positive toward the placement program (question 5).

	00/01	99/00
1. Your overall placement experience is useful to you.	51% (6%)	11% (47%)
2. You learnt new and important technical skills during your placement training.	53% (12%)	11% (47%)
3. You learnt important nontechnical skills, such as communications skills, team work, time management, etc.	60% (5%)	12% (48%)
4. Your placement training helps you decide what you want to do with your future career.	43% (8%)	8% (49%)
5. You would recommend the industrial placement program to the current year-two students.	55% (8%)	14% (45%)

III. TEACHING PHILOSOPHY AND APPROACHES

My effectiveness in teaching is the result of developing my own teaching philosophy and trying out many different teaching approaches to my classes in the last eight years.

A. PHILOSOPHY - I believe that teaching is essentially a modeling process—a teacher models for his students how to think, to learn, and to work. A teacher strives to help students develop a critical mind, a passion for excellence and quality, a systematic thinking process, and a high ethical standard.

To put my teaching philosophy into more practical terms, I use **TIPS** to summarize the specific principles that I uphold for my teaching:

- **Team-work (with my students)**: I view teaching as a team work—teaming up with my students—to make the teaching successful. I strongly oppose to the customer-client model in teaching. Students are NOT my clients, but my partners in my teaching. That is, I must be interested in them, connect to them during lectures and tutorials, provide active help, let them participate, understand their learning difficulties, and value their feedback. Students are also encouraged to study in "teams" to enhance their learning outcome.
- **Integrity (as a pre-requisite)**: Integrity, when applied to me, means that I must hold an uncompromising standard of teaching and assessment. I must make my professional judgment based on what is best for students, and I strongly oppose to the (don't-)give-what-students-(don't-)like philosophy. On the other hand, integrity for my students means that they are expected to observe University regulations regarding assessments, and not to get involved in illegal copyright-related activities.
- **Perseverance (for excellence)**: Perseverance is a necessary element for guiding one's teaching toward excellence in the long term. Perseverance, for example, is required in keeping course materials up-to-date, constantly learning and experimenting with new ways of improving teaching, and confronting with student's undesirable learning attitude. On the other hands, students are expected and encouraged to put their very best in learning and to promptly address their learning problems.
- **Success (in teaching and learning)**: The three elements above, I believe, contribute to successful teaching and successful learning.

B. APPROACHES - In the following, I highlight some of my approaches to teaching that are based on my teaching philosophy. A pre-requisite to using these approaches successfully, however, is that the subject matter must be mastered very well by the lecturer, and a set of very effective teaching materials has already been designed.

1. **Make it relevant, or else ...**
   I believe that my students will be more motivated to learn if they can see the relevancy of the subject to their career and daily lives. However, the Computer Network subjects that I teach are difficult to see visually. My approach to this problem is to relate the subject matter to them using examples that they know.

For example, I asked COMP312 students the types of ISP services available in Hong Kong. From there I could introduce the enabling technology behind those services. I usually devote my first two lectures on motivating students. If I fail to do so, they will quickly lose interests in the subject. Some positive comments from students:

- "Very practical and concept is clearly presented." (from COMP312)
- "The issues are practical and relevant to the real life situation, and the class project is particularly useful and it can facilitate our understanding." (from COMP312)
- "What I like about the course is (that) I can really learn and apply the knowledge to real life." (from COMP 530).

2. Fundamentals only, please

I believe that teaching fundamentals is much more important than teaching trendy topics. The reason is simple: students simply cannot master new technologies without having mastered the fundamentals. Grasping of the fundamentals, however, takes a long time. By fundamentals, I mean the core and indispensable concepts undergirding a certain subject area. Moreover, teaching the fundamentals is not exclusive to the undergraduate teaching; my graduate class COMP526 addresses the fundamentals on the graduate level. As a result, many students, who had prior knowledge in the subject, often realized that they actually did not understand or misunderstood the underlying fundamental concepts. Some positive comments from students:

- "Very deep understanding than other subjects-->use more time and effort than other subjects. Although it is quite harder than other subjects, I am quite enjoyable because I really know something." (from COMP555)
- "The assignment questions help understand the subject material a lot." (from COMP312)
- "The assignments help me to consolidate my concept." (from COMP530)

3. Don't be afraid of being a little unconventional

I believe that teaching is an art. It demands from the "artist or performer" creativity, rich imagination, humorous spirit, and a total immersion with the "audience." We are confronted by a new generation of students who simply will not lend their ears to "conventional lecturing." If we cannot change them, let's change ourselves. I tried to be a little more creative with my COMP312 class. I brought some LEGO blocks with me (taken from my children) and used them to illustrate the concept of network layering. It was very effective: everybody (168 students, mind you) watched me as I manipulated the LEGO blocks, and listened intently to my explanation of the concept. One student commented in my own survey that "The LEGO example (was) really impressive." I also make sure that my body language would work for my teaching—my eye contact, my gesture, my movement, and my laughter. Some other positive comments from students:

- "The lectures are not boring." (from COMP312)
- "Like: Interesting lectures with lots of examples and clear explanations from you." (from COMP526)

4. If we don't update, ...

I believe that frequent self-evaluation and reviews perfect one's teaching. I make a conscientious effort to frequently update course syllabi and lecture slides. For example, I have taught COMP312 for five times, and have used three different books. Moreover, my lecture slides are constantly updated. For example, I came up a totally new set of slides for COMP312 in 99/00. Starting from 99/00, I began to write a diary for my courses. The diary recorded points to be taken care of either in the next class or in the next time I teach this subject. The diary recorded also my self-evaluation for each lecture, and my evaluation of the students' performance and participation. Some positive comments from students:

- "The materials are up-to-date and related to daily life." (from COMP312)
- "Topics are interesting and advance. Useful for those work in networking field." (from COMP555)
- "Really learn new (up-to-date stuff) and some of them are really useful for my future." (from COMP555)

5. Let them talk

I believe that my students will learn how to think and how to learn effectively through my interaction with them. Whenever possible, I reserve some time in lectures and tutorials for planned and unplanned interactions. My planned activities include short questions on lecture materials, collective problem-solving activities, and discussion of selected magazine articles and journal papers. I encourage my students to answer questions individually, as well as collectively as a group. I sometimes invite students to come up to explain their answers to the class. This process of "verbalizing the thoughts" is very effective in teaching students to think critically and carefully. Moreover, I engage other students by asking them to vote on a few possible answers. Some positive comments from students:

- "Like: Active atmosphere. Discussion and questions in class." (from COMP312)

- "Like: Group discussion on assignment, paper discussion, marking scheme of assignments." (from COMP526)
- "Like: The class discussion and the interaction. Encourage active participation." (from COMP526)

6. Let them disagree

I believe that my students and I are on equal footing during discussions. In any kind of interaction with my students, I am prepared to receive different opinions, and challenges to my "model answers." When such circumstances actually arise, I try to be objective about the issue discussed, and to review the whole issue again without any biased opinion. For example, an MSc student disagreed with my suggested solution to a homework assignment problem during a lecture, and we spent at least 20 minutes "debating" with each other for a "correct answer." By allowing students to freely verbalize their views and not imposing on them any standard answers, I have found that my students will be more eager to participate in the lectures, and to discuss their ideas more openly and freely.

7. Let them bring books to exams

I believe that how-I-assess affects how-my-students-learn. I have been an advocate for open-book examinations (including notes, any references, notebooks preloaded with relevant information, etc). All my (undergraduate and graduate) examinations have been open-book for the last six years. I believe that this mode of examination resembles a real working environment much more than a closed-book examination. Because I announce the open-book arrangement to the students in the first class, I have observed that my students' (especially the undergraduates) learning approaches have been changed from a routine memorization exercise to putting efforts to understand the subject matter. Moreover, I never recycle my examination questions in order to ensure fairness and to eliminate students' dependencies on them. However, I use them as assignments for the following years. Some positive comments from students:

- ◊ "The course promotes independent thinking rather than memorizing. This is the most special thing throughout the two years of U-life." (from COMP312)
- ◊ "Need to fully understand the materials, not just remember things." (from COMP312)
- ◊ "Like open book examination." (from COMP312 and COMP526)

8. Let them discover for themselves

I believe that students will be excited about things that they discover for themselves than those that are discovered for them. Because lecturing time consists of only a small fraction of the total time that a student puts into learning, my role should be a coach to guide and equip them to learn on their own. Self-discovery, on a smaller scale, can be achieved through the teacher-student interaction described earlier. However, it is absolutely necessary to achieve it also on a larger scale. For this purpose, I usually assign a "significant" class project. The nature of the project varies and I have tried different things. The goal is to enhance their studies through self-discovery and group learning. Some positive comments from students:

- "I like the class project on LAN, it is interesting and I've learnt many new things for my own." (from COMP312)
- "The practical class project offers good chance to set up network and experience a lot." (from COMP312)
- "Besides, writing paper/Internet draft makes me read a lot of Internet documents which helps to understand specific topic more thoroughly and also improves writing skill." (from COMP555)

9. WEBCM (be careful, it is not WEBCT)

I believe the effectiveness of using WWW for course management (WEBCM). My COMP312 homepage actually helped my teaching scale to class sizes of 136 and 168 by presenting my teaching schedule and other information very clearly to the students, and tracking the progress of the course. Besides, the course homepage is an ideal platform to let students know my expectations, including my expectation for their integrity. For example, I included this statement in the course homepage: "You may not photocopy the textbook; we will report such cases to the appropriate legal authority." Additional resources, such as pointers to other relevant websites, additional reading materials, were also included. There was also a discussion forum where students and I could interact and share information. URLs:

- COMP312: http://www2.comp.polyu.edu.hk/~comp312/CCN/CCN.html
- COMP400: http://www2.comp.polyu.edu.hk/~csplace/Placement/Placement.html
- COMP526: http://www2.comp.polyu.edu.hk/~comp526/INPSI/INPSI.html
- COMP555: http://www2.comp.polyu.edu.hk/~comp555/INPSII/INPSII.html
- MSc projects: http://www2.comp.polyu.edu.hk/~csrchang/MSc.html