Teaching Introductory Information Technology Through English in China: Innovative Approaches to Information Technology Education

Haifei Huang and Dave Towey
Science and Technology Division
BNU–HKBU United International College,
Zhuhai, People's Republic of China (PRC)
mikehuang@uic.edu.hk; davetowey@uic.edu.hk

***Abstract*—The United International College (UIC) is a new Liberal Arts college in Southern China, whose goals include creating an innovative international education model for China that can contribute to the welfare of the nation and the world. All non-Computer Science major students in UIC are required to take an introductory Information technology (IT) course. This paper identifies some of the special challenges facing the design and delivery of such a course in the Mainland Chinese context, especially in an English medium of instruction institution. It traces the evolution of the course as UIC itself evolved from a pilot launch in 2005 with about 300 students, to the current full capacity 4,000 undergraduates. As the course content departed more and more from similarly titled courses in Mainland China, resistance from both faculty and students was met, resulting in some fundamental changes in the course vision and design. The high student:staff ratio for the course also required some innovative steps to ensure not only that the fundamental course material was being absorbed, but also that the experience of becoming IT-literate was, as much as possible, an enjoyable one. The changing (academic) profile of the UIC student has also required that the course management team adapt: most students in 2005 had a weaker academic background, spoke Cantonese, and often had difficulties with English proficiency; new students in more recent years have stronger academic credentials, come from many different parts of Mainland China (and speak Putonghua rather than Cantonese), and have a comparatively high English proficiency. This paper also explains some of the various IT and multimedia tools adopted to enhance the learning experience for students, and discusses some of the fundamental delivery structure decisions that have resulted in the current IT1010 course. Directions for the future of the course, and the teaching of computer literacy to non-Computer Science students in general, are also outlined.**

Keyword-Technology in Education; Information Technology; Technology-enhanced Instruction; Undergraduate Education

I. INSTRUCTION

Recently, the place of Computer Science (CS) and Information Technology (IT) in tertiary education has been more closely examined [1]. The People's Republic of China (PRC) has been particularly attentive to the reform of introductory courses for non-Computer Science majors [2] [3]. This paper describes some of the issues related to the teaching of an introductory Information Technology course as a required subject to all non-Computer Science Major undergraduate students at the United International College (UIC), a new Liberal Art College in southern China. The history of this course, and similarly titled courses in the PRC is outlined. The evolution of the course since it was first taught in 2005. some of the challenges facing its delivery, and some future directions for this and similar courses are explained.

A. People's Republic of China (PRC)

The People's Republic of China (PRC) was founded in 1949, and over the recent decades has become a significant global economic power [4]. Unfortunately, the PRC has also been challenged by the difficulties associated with upholding copyright laws, resulting in many consumer products (from handbags to computer software) being available at very low prices on the black market [5], [6], [7]. Partly because of the availability of pirated software at low prices, many of the IT-literate population are familiar with software (e.g. Microsoft Windows or Microsoft Office) that they might not otherwise be expected to be able to afford.

B. Introductory Information Technology Courses in the PRC

In 1997, the Ministry of Education in the PRC published guidelines on how basic computer science courses for non-Computer Science majors should be structured [8]. According to these guidelines, it was recommended that such courses be divided into three levels: basic computer knowledge; computer technology; and computer applications. Since this time, almost all third level institutions in the PRC have established such courses, but most have focused on a basic knowledge of computer systems, Windows OS, and basic Office software [9] [3].

In the early part of the 21st century, the Ministry issued a second set of guidelines [10], aiming to encourage institutions to update the courses. Amongst the cited reasons for the update was the fact that many primary and secondary schools were, by this time, teaching some of the basic course content (e.g. Windows and Office), meaning that tertiary-level students were simply being exposed to materials and technology that they were already familiar with. These new guidelines recommended replacing the basic computer

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science course with a new one focusing on basic principles and theories of computers, and having less explanation of basic computer operations.

Since these newer guidelines were released, many universities have adopted the new curriculum and have increasingly included new topics such as multimedia, information security and databases [11].

C. United International College

The United International College (UIC), jointly founded in 2005 by Beijing Normal University and Hong Kong Baptist University, is the first full-scale cooperation in higher education between the Mainland (PRC) and Hong Kong. UIC is an English Medium of Instruction institution, meaning that classes are conducted in English. It is situated in Zhuhai, Guangdong Province, just north of Macau SAR, and west of Hong Kong SAR.

There are currently seventeen undergraduate degree programs on offer, grouped into three academic divisions. Each program is run over four years.

The mission statement for UIC identifies the goal of creating an innovative international education model for China that can contribute to the welfare of the nation and the world.

Since its founding in 2005, UIC has undergone significant changes. The student population has risen from about 300 in the pilot stage in 2005, to the current full capacity of about 4,000. The academic profile of UIC's students has also changed: most students in 2005 had a weaker academic background, spoke Cantonese, and often had difficulties with English proficiency; recently, new students have stronger academic credentials, come from many different parts of Mainland China (and speak Putonghua, rather than Cantonese), and have a comparatively high English proficiency.

The fundamental targets for UIC, in terms of what kinds of graduates are expected, are described in the Graduate Attributes.

D. UIC Graduate Attributes

Graduate Attributes (GA) refer to the traits that the institution hopes to develop in students, such that upon graduation, the graduate will possess those characteristics. UIC inherits many of its GAs from its parent institution, Hong Kong Baptist University's GAs [12].

Among the target GAs for UIC's students are Computer Literacy and IT Skills, the foundations for which are provided in a 3-credit course taken in students' first semester: "IT1010: Introduction to Information Technology".

II. UIC'S INTRODUCTORY IT COURSE:IT1010

In this section, the introductory Information Technology course taught at UIC is explained in detail. The motivation and history of the course, as well as its evolution to the current form are explained. Current challenges and directions for the future are also discussed.

As outlined in Section I-D, one of the desired Graduate Attributes of UIC students is IT-literacy. To assist in this, all students who do not choose Computer Science as a major are require to take a semester-long course in IT, called Introduction to Information Technology (IT1010), in their first semester of studies.

A. IT1010 Learning Outcomes

The IT1010 course is designed to introduce students to the fundamental concepts of Information Technology (IT), and develop students' confidence in using computers and computer applications. More than this though, as has been identified in the literature, Computer Science has a lot to offer to a Liberal Arts education, in particular the so-called "problem-solving perspective" [1]. One of the explicit goals of the IT1010 course is to develop this problem-solving attitude and skill.

In the course, students are introduced to the background of Computer Science, and the modern IT sector. Some of the major IT organizations are introduced, and current IT issues and questions are discussed. The basic architecture and design of a computer is explained. Software applications useful for students of all majors are introduced and, where possible, more than one alternative is presented: whenever possible, free alternatives to common propriety software are also presented. Students are also introduced to strategies for purchasing and maintaining computer systems.

Since the course was first introduced in 2005, it has been restructured according to the principles of Outcomes-based Teaching and Learning (OBTL) [13] [14].

The most recent version of the course has the following Learning Outcomes:

1) Knowledge: Successful students will typically be able to:Describe and explain the fundamental concepts of Information Technology; Describe and explain major applications of Information Technology; Identify and discuss basic issues/questions related to the current Information Technology world; Identify/describe the main functions and components of a computer; Describe (more than just propriety) major operating systems and application software used in computers; Describe and explain the architectural frameworks of the Internet and World Wide Web; List and describe different methods of publishing on the Web; Formulate strategies for purchasing/maintaining computers and computing equipment.

2) Skills: Successful students will typically be able to: Identify/choose appropriate software to use to solve publishing (desktop to Web) problems; Create their own personal Web sites (using appropriate software); Use computer software (such as word processing and spreadsheet applications) to prepare their assignments; Choose and buy a suitable computer for their personal use; Use sophisticated (non-WYSIWYG) publishing software (e.g. LATEX).

3) Attitude: Successful students will typically be: Confident using computer applications; Confident approaching IT applications to be used for the first time; Open-minded about more than one possible IT solution to problems.

B. IT1010 Course Content

The course content varies from year to year; Table I lists the major topics covered in the IT1010 course in 2010.

C. IT1010 Course Delivery

IT1010 is delivered over the course of a single semester, usually 14 or 15 teaching weeks, with three lecture hours, one computer lab contact hour, and several Consultation hours per week.

1) Constraints: Some of the challenges facing the IT1010 teaching team include the fact that since UIC uses English for instruction, the course must be delivered through English. As explained in Section I-C though, especially in the earlier years of the course, many students appeared to have difficulty with English. This meant that a multi-lingual team was required to ensure comprehensibility, especially for the support team of teaching assistants (TAs).The ratio of students to teachers has also been a constraint: approximately 1,000 students take the course, but there are only 5 to 10 instructors, and only about 5 TAs. These ratios effectively rule out small class sizes for lectures or tutorials.

2) Group Work: Part of the underlying ideology of UIC's approach to education is influenced by the one-child policy in the PRC [15] [16], which results in many PRC students coming from a single-child family. This feature of PRC students resulted in the UIC founders creating learning opportunities which emphasized teamwork and team-building, including the popular Experiential Development Programme (EDP), a 1- semester required course designed to build leadership and teamwork skills.

Motivated by the success of EDP, the IT1010 course adopted the team structure for as much of the tutorial and assignment work as possible. Because IT1010 is taught in the first semester, many students initially may not yet know their classmates. Within the first week of the course, all students are grouped into teams of four to six members, and will remain in these teams for the duration of the course. Tutorials, attendance, and assignments are aimed at the team structure, thereby both fostering teamwork, and reducing the burden on the teachers

TABLE I. LIST OF MAJORTOPICS TAUGHT IN THE IT1010 COURSE

Week 1	Course Introduction
Week 1	iSpace (Moodle)
Week 1 or 2	Word Processing
Week 1 or 2	Presentation Software
Week 1 or 2	Spreadsheet
Week 1 or 2	Cloud Computing / Google Docs
Week 2 or 3	Introduction to Computers
Week 3	Computer History, Algorithms, etc.
Week 3	Introduction to (some) I.T. Companies
Week 4	Number Systems
Week 4	Data Representation
Week 5	LATEX
Week 6	Cyberspace
Week 6	Hacker Culture
Week 7	The Internet
Week 8	Web Publishing
Week 9	Content Management Systems
Week 10	Image Processing
Week 11	Operating Systems
Week 12	Database Basics
Week 13	Purchasing a Computer
Week 13	Computer Security and Ethics
Week 14	Revision

3) Tools: When the course was first taught, the delivery was based on the traditional lecture/lecture notes model, where each instructor basically prepared their own slides and notes, making the notes available to the students. In the second year, attempts were made to centralize the course: instead of each of the instructors essentially delivering a separate IT course, all instructors began to use the same materials (slides, handouts, etc.). The course later evolved to using a single main website and single electronic Bulletin Board System (BBS) for all students in the course. As the course content developed, so too did the technology used in its delivery: in the third year of the course, Content Management Systems (CMS) were included in the content, and a CMS (Joomla [17]) was used to manage the course website. Later, the IT1010 Content Management System Joomla was replaced by a Course Management System (MOODLE [18]), which was also adopted to be the main teaching support system used by UIC.

As explained in Section I-C, in the early years of the IT1010 course, one of the major challenges was the comparatively low English proficiency of the students. To assist these students, the main vocabulary items in the IT1010 course were translated into Chinese. Later, sound files with the English pronunciation were also made available.

To further assist students, videos were also produced IT1010 staff illustrating how to use some of the IT applications in the course. These mini-videos were made available for the students to access whenever they choose

III. COMPARISON OF IT1010 AND OTHER IT COURSES

Compared with similarly titled courses in the PRC, UIC's IT1010 course has some significant differences.

Firstly, IT1010 focuses on introducing alternatives to the software that students have become familiar with in primary or secondary schools, emphasizing the possibility of cheaper or free alternatives. An obvious example of this is for the course sections on Word Processing, Spreadsheets, and Presentations, where both the OpenOffice [19] and Google Docs [20] software suites were introduced as well as the traditional Microsoft Office versions [21].

Many PRC institutions structure their courses to prepare their students for national exams [3] [22] [23] [24] [25] [2]. Because of this, the course structure is relatively rigid. At UIC, because the IT1010 course is not geared towards any specific external exams, there is an in-built flexibility: if a new topic is deemed relevant and worthwhile, it is easily included in the course.

IV. FUTURE OF IT1010

Information Technology is a very fast-evolving sector, and the IT1010 course tries to adapt accordingly: as new topics and questions appear in IT in reality, so too do they appear in the course. New topics are included in the course based on both instructor and student feedback.

Because of the popularity of the self-access materials (such as the mini-videos explained in II-C3), this will continue.

A very successful strategy was developed by another unit at UIC, the Teaching English as a Second Language Degree program (TESL [26]). The strategy is to use current students who have the relevant subject expertise as Student Teaching Assistants (sTAs). These more senior students act as mentors to the new students, and provide an additional bridge between the instructors and the staff.

Although IT1010 is taught to all non-CS majors, there is no variation in the course materials for specific majors. Clearly, certain majors will have specific IT interests beyond the basic IT1010 materials, and certain majors may have interest in more in-depth knowledge of a certain IT topic than is provided in the IT1010 course. To assist such students, a body of materials (including IT1010 staff-produced videos, references, and notes) that go beyond the scope of the course is in development. These materials will also be made available to students on a self-access basis.

V. CONCLUSION

This paper has introduced the IT1010: Introduction to Information Technology course taught at United International College in Zhuhai, People's Republic of China.

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