

Development of a Professional Development Programme and Recording System for Information Systems Undergraduates in an Action Learning Environment

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A b s t r a c t

City University places great emphasis on the professional orientation of many of its undergraduate and postgraduate programmes. The BA (Hons) Information Systems was originally developed in 1991 to provide a pool of skilled and capable graduates who would enable Hong Kong businesses (which here includes Government and industry) to take advantage of information technologies in the 21st century. The course of study provides studies in the various subjects through coursework and examination. The development of professional skills is, however, a much more subtle process than the formal assessment. They are, though, not recorded in any way, and students may (because they are not encouraged to think of them in this way) not even realise that each interview is an important act in professional development. This project reviewed what is meant by professional development for IS students, looked at how the students' own awareness of the professional development process was affecting them, and at how various experiences of professional skills could be noted and held as permanent record of individual development.

Introduction

The primary aim of this project was to develop, implement and evaluate a scheme for equipping undergraduate students of information systems (IS) in City University (CityU) of Hong Kong with the skills necessary for working as professional IS developers in Hong Kong. In particular it focuses on developing a Professional Development Programme (PDP), through which students can record the relevant skills acquired and, consequently, improving the quality of the professionally-oriented modules of the course.

Drawing on internal (academic staff, students) and external (professional bodies, employers) sources, the project has identified a comprehensive set of required skills and the means of assessing the achievement of competence in those skills. The project has also established a means of teaching and, in particular, learning which will enable students to practise, act and review their performances.

What Are the 'Professional Skills'?

In any discipline professional skills tend to be wide ranging. For information systems specialists,

their skills must include the ability to 'investigate, analyse, design, implement and evaluate' computer-based information systems. In particular, an IS professional must be able to (1992, City University of Hong Kong):

- design, develop and introduce computer-based information systems to organisations;
- maintain a detailed knowledge and understanding of technology;
- have an understanding of the nature of organisations and people at work;
- make finding a business solution to business problems the goal.

In addition, this IS professional must have:

- social skills, especially communication skills, in formal report writing, oral presentation and interviewing; and,
- the ability to interact effectively with people.

And, most important, they must be aware of the human, social and organisational impacts of information technology.

Within the context of the IS curriculum that our students follow in their course of study in CityU, the concepts, foundations and technical aspects of information systems are well covered. It is the social skills and the ability to interact effectively with people that this current project is trying to enhance and eventually formalise in the curriculum.

Defining the Qualities

One of the most important initial tasks carried out by the project team was to define a list of professional qualities appropriate for IS professionals. There were a number of reasons for setting up this list. First, one of the objectives of our project was to develop a PDP to provide and record professional awareness and training in the BAIS curriculum. This initial list of professional qualities would be the first step toward developing the PDP. Second, in the first year of the project, we tried out various activities in our classes in order to determine which activities work well and which do not. The list acted as a focal point for mapping the various activities for the development and training of the appropriate professional qualities.

The list of professional qualities was defined as follows:

1. Confidence
2. Presentation abilities
 - report writing
 - verbal
 - use of media
3. Ability to give constructive criticism
4. Communication skills
 - discussion
 - listening
5. Interviewing
6. Diligence

- tenacity
 - patience
 - thoroughness
7. Personal and professional ethics
 8. Team building abilities
 9. Independence
 - ability to plan and manage processes
 - 10.

Leadership

At a first glance, the qualities contained in this list do not seem to be IS specific. It would be desirable, even essential, for all undergraduates to be endowed with these skills while they are at CityU. This list as it is, however, does represent some of the major qualities and abilities that other participants in the IS development process, namely, the managers, users, clients and sponsors, would like to see in their systems analysts (Hunter, 1993). Eventually, the project team hopes that other departments and faculties would consider incorporating our PDP into their curricula. Thus it would be an advantage to keep the PDP general and flexible for adaptation.

A Model for Active Learning

Early in the project it became clear that some framework for understanding action learning would be necessary, particularly action learning in developing IS professional skills. A working model was derived from the identification of the skills required. This model was then used to operationalise the action learning activities during the two year study. Wherever possible, the model was couched in student-centered terms, to assist students in understanding their role in the action learning process.

The model consists of three major activities within group or team settings:

- Interacting (coping with group activities)
- Learning (by applying knowledge to solve problems)
- Reporting (or communicating to others what has been learned).

Interacting

Group/Team Skills

The activities identified are:

- *Attending* — being there;
- *Starting* — gaining active participation from all members;
- *Setting group goals* — answering the ‘why are we here and what are we trying to achieve’ questions;
- *Distribution of participation and leadership*;
- *Seeking and giving information* — listening;

- *Flexible use of decision making procedure* — try to reach a consensus;
- *Problem solving ability*;
- *Power and influence* — forming coalitions;
- *Conflict* — encouragement and resolution;
- *Maintaining group cohesion*;
- *Mediating* — we are not part of the conflict, but try to mediate between two conflicting parties;
- *Gatekeeping* — involving and controlling people's contributions (team leader's skill);
- *Face* — to give face to all people in order to get the results that we want;
- *Power-distance relationships* — to handle seniority;
- *Diplomacy and Tact in relationships* — to ensure that working relationships are maintained at all times;
- *Adapting personality/behaviour to the group*;
- *Tension and its reduction* — monitoring the temperature of the meeting;
- *Politicking and hidden agenda* — recognising what the meeting is really about.

It is generally assumed that Hong Kong students are excellent at working in groups. However, results of experiments in the first year of the project indicate that, whilst they are good at cooperative activity, they do not have the organisational skills needed to accept different forms of leadership or to be goal-oriented. This may bypass the lecturers and lead to poor learning outcomes.

Learning

We are concerned with two specific areas on the topic of learning:

- Learning by applying knowledge to solve problems.
- Learning how to plan, manage and control a project to solve a problem.

The associated activities identified are:

- Reviewing and analysing the problem
- Identifying constraints
- Identifying resources
- Formulating solutions
- Considering alternatives, and choosing an option
- Project management
 - * identification of tasks
 - * allocating resources
 - * monitoring progress
 - * taking remedial action.

In order to facilitate problem-based learning, the following need to be addressed:

- ensure students' knowledge of subject area required is sufficient to make a start
- ensure students have access to required resources
- motivate the students to have an interest in the problem
- the process must be structured and monitored and desired learning outcomes identified
- give students opportunity to display learning outcomes
- reward good learning outcomes.

Reporting

We use the term 'reporting' to mean communicating to others either what has been learned about a given task or the solution to a problem. In their present environment, i.e., as a student in the university and later as an employee in an organisation, this 'reporting' usually takes the form of an oral presentation or a written report (although, increasingly, computer-mediated communication — e.g., by using email — is being used). Although written reports submitted by our students are by no means perfect, students do have more chances to practise on their report writing skills and hence receive more feedback about them. As students, they have fewer oral presentations to perform, and correspondingly receive less feedback. Yet when they graduate and start working, they very often have to use their oral presentations to impress their superiors and peers. Only then will their written reports actually be read and acted upon. Thus the following list of activities for presentation ability (again written from the student's point of view).

Preparation

- having the right attitude
 - ⇒ you are preparing something that you believe is worth the effort required
- recognition of purpose
 - ⇒ understanding the purpose of the presentation; e.g., is it to introduce a new item or to reinforce a used technique?
- audience identification
 - ⇒ level of their expertise relating to the subject
 - ⇒ their understanding of your terminology and jargon
- confidence building
 - ⇒ know the material
 - ⇒ practise the script
 - ⇒ check supporting artifacts
- time management.

Verbal Presentation Skills

- have the right attitude
- check the speed of the speech
- make use of appropriate examples

- make eye contacts with the audience
- use gesture and facial expression to emphasise certain important points
- talk to the audience (not to yourself)
- check your time.

Use of Media

- appropriate use of media to enhance (not take over) the presentation
- appropriate choice of font style and size
- appropriate use of graphics
- appropriate use of colours
- transitions between media
 - ⇒ if more than one medium is used, the presenter should pay attention to the transition from one medium to another.

Audience Response

- Reaction from the audience
 - ⇒ Are they nodding in agreement?
 - ⇒ Are they frowning with amazement?
 - ⇒ Are they falling asleep?
- Immediate adjustment to the presentation
 - ⇒ Slow down or quicken your speech
 - ⇒ Ask for questions
 - ⇒ Change of media.
- Handling questions
 - ⇒ An indication of whether the audience understand your presentation
 - ⇒ An indication of whether the audience agree with you
 - ⇒ You should anticipate or pre-empt some questions and be prepared for them.

Reflection on Outcome

- What is the expected outcome of the presentation?
- Is the outcome satisfactory?
 - ⇒ If it is, why? If it is not, why?
- Learn from the experience to improve your next presentation.

The Professional Development Programme Recording System

We have already noted that the technical aspects of the professionally-oriented modules are well documented. Every module has a published syllabus, to which is typically added a teaching plan, and the student has both. Thus the discipline subject matter is well specified. The work done by the student on which their performance is assessed, normally a combination of assessed coursework and examination, is also published. Assessed coursework, i.e., coursework which contributes to the grade for the module, is identified by the specification of the work to be done and by the graded work returned to the student. The examination paper is also normally retained by the student, although answer scripts are normally retained by the University. These all combine to form a comprehensive, detailed and substantial portfolio of work done by the student.

This is, though, by no means a complete view of the activities performed by the student on the course. Each module is taught usually through a combination of large group (usually lecture) and small group (tutorial and/or laboratory). A wide variety of teaching styles may be adopted, and an equally wide range of learning activities provided, not all of which contribute directly to the assessment of the student. In addition, a general rule of thumb sets student work outside the classroom at about two hours for every one hour in the classroom. In a typical module of three hours per week for 14 weeks, the student has some 84 hours of work expected to be done out of class. Thus, classroom activity, while directing the work of the student, represents the 'tip of the iceberg'.

As an example, a piece of assessed coursework may be set in which students are required to work in teams of four to investigate a system and prepare a proposal for a new computer-based system. Although time may be set aside in class for some of this work, the size of the task will mean that team meetings have to take place out of class. Similarly, interviews with the 'client', reporting sessions to 'clients', etc. will all have to be done out of class, as will the research needed to prepare the design specification. In this way, many of the professional skills considered important — managing meetings, leading teams, conducting interviews, etc. — will all take place outside of the classroom, and may not eventually form part of the report required. Yet all are necessary components leading to the final report.

Extra-Curricular Inputs

The taught courses are not the only ways in which students extend their professional skills. A typical university encourages students to participate in a wide variety of activities, both social and sporting. In City University this development occurs in two forms, one through the Student's Union (SU) and the other through the Student Affairs Office (SAO).

The SU provides a wide variety of clubs and societies, organised and run by students for students. Typically each club or society has a committee responsible for running the club. In many cases, the committee is responsible for managing not just the affairs of the club through organising various events, but is also charged with managing budgets. Many of the skills required to run SU activities are the same as those we wish to develop for professional work. The recording system should allow such activities to be shown as contributing to organisational and professional skills. The SU, of course, has its own Executive Committee where management skills are employed and honed by students, and this is equally relevant.

The SAO of City University provides one of the richest set of courses for developing the 'whole person' to be found anywhere. It runs the Venturing Success programme as an extra-curricular facility for students. This covers some 65 short courses preparing students for employment, under headings of: Career Self-explorations & Consolidation; Career Education & Career Decision

Making; Job Search Skills Training; First Job; Workplace Management & Lifelong Career Development; and Teaming Up for Success. In all of these courses, students work in small groups in a highly interactive way. They learn not just from the SAO leader of the course but from one-another. They make use of all of the non-technical professional skills when they participate in these courses. Since our aim is to capture all activities which contribute to the enhancement of these skills, we actively encourage IS students to take part in the Student's Union and in the SAO courses, and to record the relevant events in their diary.

Finally here, many of our full-time students have part-time jobs, or are employed in relevant organisations as interns during the long vacations. Although most frequently employed in technical tasks, usually in programming, they are also involved in writing documentation, in meetings with their superiors or in working with the client. Such activities are highly relevant to professional development, and can contribute much to the professional development programme.

The Recording System

The Professional Development Recording Programme System (PDRPS) seeks to capture this richness of activity and, at the same time, to cause the student to think more carefully about the ways in which his or her professional skills are developing. As presented it consists of an A5-sized form to be completed by the student whenever they believe that a relevant professional development activity has taken place. A copy of this is provided as an Appendix. In practice this will be reduced to a standard Fil-o-fax format, since all new entrants to the BBA programme in the Faculty of Business are provided with a holder for this.

A number of formats were considered. There is some advantage in having, for example, a distinctly different colour for each type of professional activity. There is an immediate and visual indication of development, or its lack, in any given area. At the same time, though, such things can discourage the recording. Not having the 'right colour' form means that the student has to find the appropriate form before the recording can be done, and this may lead to choosing not to record. Equally, filing the record by type of activity also enables the student to be aware of how their development is growing. However, where more than one activity is being recorded at a time, filing becomes more difficult. Thus, in the end, a simple format was chosen: one form to be used, all one colour, no restrictions on filing, etc. The record is for the student's benefit, and the student is allowed to make use of the facility in whatever way they consider best.

The final version of the form is given in the Appendix. It consists of a simple set of instructions and guides, together with the form proper. The detail on the form has been kept to the bare minimum, to allow flexibility in use. It allows for the recording of both technical activities (e.g., database designs, network configurations) and the more general but equally important skills outlined earlier in this paper. Although it gives space for verification by a teacher, this is neither compulsory nor essential to the value of the system.

At the time of writing, the system has not been implemented, but in the coming academic year will be used across all three years of the IS undergraduate programme.

In keeping with the technological nature of the IS discipline, we are developing an alternative form for recording professional development activities, this being based on the World Wide Web. All IS students have their own electronic storage space, and maintaining the PDRPS on-line is expected to provide an easier alternative to the paper-based system. The first version of this will not have facilities for authentication by the lecturer, but a later version will provide this through electronic signature.

Implementation and Evaluation

At the time of writing, the full system has not been implemented. The current planning phase is concerned with the introduction of the full programme across all three years of the IS undergraduate programme in the coming academic year. This final section of the paper describes the team's experiences with the implementation of individual components of the programme, and the impacts of this evaluation on the design of the final system. Experiments with the programme to date have been based around those modules taught by the project team. The project has progressed through three key cycles within the action learning paradigm.

Cycle 1 — Review of the Current Student Acquisition of Professional Skills

Having defined the professional qualities which we were interested in promoting, the team investigated the current IS undergraduate programme for ways in which students might already be acquiring key skills. The skills listed at the start of this paper were classified into two main groups: technical and personal skills. Technical skills are those which, to some extent, can be taught and practised. This group includes presentation abilities, communication skills, interviewing, team building abilities and leadership. It was decided that these would form the focus of the project. Personal skills may be acquired indirectly through accomplishments in the first group. These include confidence, ability to give constructive criticism, personal and professional ethics, diligence and independence.

Evaluation of this cycle led to the conclusion that the skills the team wished to foster in our students were currently being practised. However, the interacting, learning and reporting activities were focused on individual module material in an ad-hoc fashion. For example, students may be required to work in teams for a piece of course work in one module, where the aim is to solve a problem and present the results. Student feedback at the end of such work indicated that their efforts were concentrated on the module material and that the teamwork, problem solving and presentation activities involved in the task were considered important only in so far as they assisted in the achievement of the course work goals. When asked what they had learned about the professional skills themselves, it became clear that such opportunities were being wasted.

The planning for the next cycle involved the project team in isolating the areas of their own modules where the professional skills might be more formally treated, and planning experiments to determine the most appropriate ways in which the skills might be acquired.

Cycle 2 — Formalise an Approach to Student Acquisition of Professional Skills

The aim of this cycle was to experiment with a variety of techniques for encouraging the students to develop awareness of, and competence in the targeted professional skills. Experiments were conducted within the modules of the team members, and the student activities were kept within the context of the module material. At the end of the cycle, the best practice would be formalised by the team. Another aim of this stage was to identify any skills which could not sensibly be covered within those modules taught by the project team members, and to identify how the programme could be extended across the entire IS degree.

Evaluation of this cycle has been reported in Wade, Wong, Champion and Chamberlain (1994) and led to the development of the Recording System which has already been discussed. The agreed best practice formed the basis for the next cycle, in which the project team adopted a uniform approach to the introduction of professional skill acquisition.

Cycle 3 — Application of the Recording System to Individual Modules

In order to refine the agreed approach, it was important to test the components and evaluate the student responses. Three key elements of the final version of the programme were evaluated and the results are presented below.

Student Motivation

If our students are to receive the full benefits of the programme, it is important that they are sufficiently motivated to spend their time in using the system. Because the PDP does not appear to fit into the usual work/reward structure of the degree programme, a lot of early feedback from the students focused on why they were being asked to do it. Three possible solutions for this problem have been developed by the team. First, it is intended to invite external professionals (and potential employers) to introduce key aspects of the programme as an introduction to the students. Second, it is felt that when the programme is fully implemented, the long term nature and coherence of the material presented will encourage the students to use it. Last, proper monitoring and management of the students' progress will be introduced. This last point is explained in the next section.

Programme Monitoring and Management

The importance of emphasising a coherent programme over the three year degree course has already been mentioned. One implication of this is that the students' progress should be monitored and discussed throughout their time at the University. While many of the activities will take place as part of the course modules, it is unrealistic to assume that module leaders will have time to discuss PDP issues during their normal contact time. As an independent innovation in the IS department, a personal tutor system has been introduced this year. The primary aim of the system is to provide informal guidance and advice to students as they progress through the degree programme. The project team intends to introduce the PDP as part of the activities of the personal tutor meetings.

Staff Motivation and Task Identification

Staff acting as personal tutors will clearly have to support and encourage student use of the PDP. One last task for the project team is to introduce the programme to all staff in the IS department. While module leaders will not be expected to devote teaching time to the PDP, it is important for student motivation that the staff are aware of the programme and its aims. In this way it is hoped that the module teachers will be able to identify relevant parts of their modules for possible inclusion in the programme. Eventually, the module syllabi will be updated to include these activities.

Conclusion

This project has allowed the development of deeper insights into student learning on this vocationally-oriented programme. A number of experimental teaching and learning techniques have been tried, to develop and extend both the technical and the wider professional skills of IS students. The need for training in team activity has been a particular issue identified.

Although the PDRPS has yet to be tested, it is seen as a corner stone of both active learning by the student and of the portfolio of educational experiences to assist in the employment of the graduate.

Appendix

Professional Development Recording Scheme

This booklet is designed to allow you to record all forms of activity which might be regarded as preparing you for work in a professional information systems environment. Using this booklet to record the activities undertaken will give you a sense of progressive development and also a record which you can use to show to a potential employer the skills you have and the extent of your training.

A number of professional skills are listed below. Although these might be regarded as 'core' skills, there may well be others that you identify during your degree studies. You should also include a record of these additional activities to give a fully comprehensive view of your professional development.

The pages of this booklet provide space for you to record the various activities undertaken on your degree programme. Although many of the activities will come from work set for you by IS courses, you should find that many of the skills are also developed in other courses on your degree programme. You should record those also, so that you are able to present a comprehensive view of your professional development. Many other activities during your undergraduate programme will also contribute to these skills: student union activity, Student Affairs Office courses, industrial placement and vacation jobs also help. Keep a record of everything you do which contributes to building your professional skills.

The responsibility of maintaining this record is entirely yours. It is for your benefit alone. You may expect to be reminded from time to time to keep the record up to date, but no-one will check up on you.

Professional Skills: an IS professional needs many skills. In addition to, and perhaps even more important than, the normal technical knowledge, the IS professional needs to be able to interact and communicate with a wide range of people. Thus this Professional Development Record concentrates on communication skills: interviews, reporting, presenting, meeting management. It also allows you to keep a record of the technical activities you perform, either independently or as part of a team.

Interviews

You may be involved in individual interviews for systems studies or group interviews. Some may be outside of IS but still will contribute to your interview skills.

Presentations

These may be formal or informal and may also be individual or group presentations. Anything where you have to explain and justify your ideas and be questioned on them would count under this heading. Mini-lectures, debates, group discussions and role-play exercises also count. Keep a record of the language used.

Report Writing

Almost anything where you are required to present a written report will count here. The report may be technical, as in a requirements specification or a program specification, or management oriented as with a strategy or business plan. Many courses outside of IS will require these, so record them here.

Meetings Management

Meetings are for the purpose of achieving objectives through group interaction. Where interviews are usually one-on-one, meetings involve three or more people, often have a formal (or at least an informal) agenda, and require management to get the best out of each member. Every time you are in a team, and the team meets, you have a meeting. Every time you or your team meets with one or more clients, you have a meeting. Experience in preparing for, managing and reviewing the results of meetings is a valuable preparation for professional practice. Keep records of all meetings, which may be from IS activities, from courses outside of IS, or from extra-curricular activities.

Designs

Although some of these will also be reports, many will consist of just technical documentation. Included here may be system designs, process or data models, program designs, network or client server designs, internet or intranet configurations, human computer interface designs and so on.

Project Plans

Project planning and management may also be required. This might include using software process and project management tools.

Other

There may be other forms of professional development tasks that are not listed above. An example would be the development/implementation of a set of guidelines to publicise and enforce professional and ethical standards in IS projects.

Each page represents a different professional development activity. Activity Date is the date when you handed in the work or carried out the task. Select the appropriate form of Activity. Name the course code and the lecturer involved. If for an extra-curricular activity, say so.

Professional Development Recording Scheme

BBA Information Systems

Activity Date: ____/____/_____

Activity: Interview / Presentation / Report / Design / Project Plan /
Other _____

Course & Lecturer: _____

Purpose: _____

Description of Activity: _____

Critical Review: _____

Student Signature:

Lecturer Signature:

Date:

_____/_____/_____