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ITP4229

Getting Information Systems Research Students Started

Tanya McGill
School of Information Technology, Murdoch University, Australia
Tel: 61 8 9360-2798, Fax: 61 8 9360-2941, mcgill@murdoch.edu.au

ABSTRACT

This paper reports on an approach to getting information systems research students started. The approach involves beginning research students undertaking a structured group research project in which the instructor is an active participant. The major purpose of this group project is to provide a gentle, supportive, very structured introduction to information systems research. This approach benefits students by ensuring that they have participated in a complete research project before they have to assume complete responsibility for their first large individual project. In general, students have participated well, learning from their own experiences and the experiences of others in the group.

INTRODUCTION

Although the majority of information systems students graduate and start work in industry as information technology professionals, a minority reenroll in research degrees. In a number of countries the initial introduction to information systems research for university students is via an honours year that includes a substantial research dissertation component (e.g. Australia, the United Kingdom). In Australia this project is usually supervised by either a single academic or two academics and usually accounts for at least 50% of the student's grade. The honours year also usually contains a number of advanced theory topics and may contain a research methods course. Performance in the Honours year is a major determinant of acceptance into a PhD program.

Starting to undertake information system research can be a difficult and unsettling time for students (Clarke, 1998). This paper describes one approach to facilitating the introduction of information systems research students to their research career: a structured group research project with the instructor as an active participant. This approach is intended to be complementary to the traditional means of research training such as direct guidance by an individual supervisor and formal research methods courses.

BACKGROUND

Various approaches have been proposed as useful for helping information technology students to acquire the skills and experience they need to undertake successful research. The following section reviews some of these approaches.

Supervision

For many students their first exposure to the process of undertaking research is when they enrol in a post graduate research degree and this may be a relatively solitary experience. Cullen (1994) notes that in a number of countries a single supervisor or supervisor and associate supervisor is common. He points to an inadequacy in this traditional means of supervising postgraduates and recommends that a study be made of other strategies to restructure graduate education. In particular he notes that in an Australian study he conducted only 22% of students obtained advice from anyone other than their primary supervisor. He comments favourably on the American PhD system, which makes greater use of a panel of supervisors and thesis advisers.

In the honours year as well as during PhD studies, students' performance can be very dependent upon the input of individual supervisors. However individual supervisors may not have the time or interest to cover more than is strictly necessary for an individual project, and may end up supervising students who are not directly in their area of interest.

Research Methods Courses

Whitten and Bell (1993) acknowledge that many research skills can only be learned under the direction of a supervisor who is expert in the subject matter, but recognise that researchers also need more general research knowledge and skills. They describe two courses offered at their institution to train information technology research students. Courses such as these are offered at many universities[i]. Research methods courses for information systems research students are usually of one of two types. They may focus mainly on practical skills such as library research, thesis preparation and oral presentation skills. Alternatively they may have a broader focus introducing students to a range of research methods such as experimentation, survey research, case study research and action research.

Other Approaches Tried

Ridley (1995) also notes the difficulty of starting out in information systems research and discusses the particular difficulty of selecting and focussing information systems research projects. She explores the role of doctoral consortiums in this process and is generally positive about their benefit, but suggests that systematic expert review may be of even more benefit.

It has also been suggested that students should be introduced to information technology research at the undergraduate level. Reed, Miller and Braught (2000) describe a very comprehensive effort to introduce a research culture throughout an entire undergraduate computer science curriculum.

Cunningham (1995) discusses the difficulty of providing an authentic research experience to undergraduate students and describes a successful third year project (in a databases course) in which information technology students designed, conducted, and wrote up bibliometric experiments. The project was designed to give students an experience with the scientific method and to encourage familiarity with the scientific publishing process and with the information technology professional literature. Clarke (1998) also describes an approach that uses an undergraduate class experiment to teach an empirical approach to designing human computer interaction (HCI). The focus in this approach was on obtaining empirical skills to help specifically in HCI design rather than on undertaking more general research.

Borstler and Johansson (1998) describe a 'conference course', a course designed to introduce undergraduate students to research and improve their written and oral communication skills. The course they describe was organised as a 'real' conference and open to the public. However, because of time limitations most of the papers submitted by students were literature review than research papers. Students did not thus necessarily gain practice with a range of research skills.

This paper appears in *Issues and Trends of Information Technology Management in Contemporary Organizations,* the proceedings of the Information Resources Management Association International Conference.

RATIONALE FOR THE STRUCTURED GROUP PROJECT APPROACH

This paper reports on an approach for getting honours research students started. It involves honours students undertaking a structured group research project in which the instructor is an active participant. This project is undertaken as part of a research methods course and is designed to provide concurrent practical illustrations of the theoretical concepts being covered in the research methods course.

The major purpose of this group project is to provide a gentle, supportive, very structured introduction to information systems research. The introduction is relatively gentle because the instructor is an active participant in the research project. Students gain the benefit of the instructor's experience, yet are full participants themselves. In his report on the use of class research projects, Clarke (1998) noted that the balance between students and instructor is important. Students should not be expected to execute research perfectly, nor should they be seen as research assistants to the instructor.

The approach proposed in this paper encourages students to discuss and solve problems in groups. This is not possible in their individual honours projects, but is important both to facilitate their learning and to prepare them for the fact that much information systems research is done in teams.

Students are encouraged to contribute fully by providing the incentive that if the project is well done we will try and publish it at a conference. Having a publication record improves a student's chances of admission to a PhD program and improves their chances of obtaining a PhD scholarship.

This approach differs from that of Cunningham (1995), described in the previous section, because the instructor is an active member of the research group. However, it is similar in that the possibility of publication is provided as a performance incentive. It is also similar to that of Clarke (1998) in that the instructor is an active participant, however Clarke's projects were not intended to provide a general research grounding, rather to focus on raising awareness of empirical skills in HCI design, so the projects undertaken only involved replication of existing work.

THE PROCESS FOLLOWED

The following section describes the general sequence of stages followed for each project, these are also summarised in Table 1 below.

Students are first provided with an outline of a possible research area. This is brief (less than 2 pages in length) and deliberately designed to be fairly general to allow students some flexibility in the final project chosen. Two criteria have been used in choosing the suggested research area. Firstly, it should not require too much prior technical knowledge, both because the group may contain students with a range of backgrounds and because the time constraints (see Table 2 below) mean the project must be achievable in 3 to 4 months. The second criteria is that the project should be within the instructor's area of expertise so that they can provide good guidance, can identify problems early and can maximise the chances of publishing the results.

Students then undertake a preliminary literature review prior to finalising the research topic. This reinforces their information seeking skills and enables them to make an informed choice of project. It also lays the foundation for making decisions about research design.

In stages 3 to 7 the instructor participates as a member of the research group. The group next decides on the final research topic and the research questions to be answered. If appropriate to the kinds of research questions, hypotheses are also formulated. Whilst all participants must accept roughly the same set of research questions, there is some scope for individualisation and variations on how they are presented. Similarly there is some scope for variation in hypotheses, so each student can 'maintain' their own set.

In the next stage the research design is planned. As only one project is carried out at a time all group members must accept the chosen research design. The work is then divided up (e.g. two participants may be primarily responsible for questionnaire design, two may organise piloting etc.) and the project carried out. The projects carried out so far have involved between 2 to 5 students as well as the instructor.

Table 1: Summary of project stages

1. The instructor provides students with an outline of a possible research area
2. Students undertake a preliminary literature review
3. Group negotiation is used to decide the actual research topic and research questions to be answered
4. The research design is planned
5. The research project is carried out as a group
6. Data analysis is undertaken
7. Individual write ups are done by students
8. A joint paper is written by the instructor using the student papers as a starting point.

Analysis of the data has been primarily overseen by the instructor as many information systems students have little previous statistical experience. All group members receive a core set of results plus may undertake additional individual analysis. The issue of lack of statistical background has been addressed somewhat in the later offerings of the research methods course with a formal introduction to SPSS and the use of statistics in information systems research. This has led to an improvement in students' ability to actively participate in this stage of the project.

The final stage of the project is the write up. Students submit an individual report in the form of a conference paper, and students are marked on them individually. At a later stage the instructor writes up a joint paper using student papers as a starting point. Those students who are still interested can also be involved in the final write up and benefit from seeing the importance of making iterative improvements to project write ups.

The entire project must be carried out within one semester (about 15 weeks). In order to encourage students to start the write up early, a schedule such as the example shown in Table 2 below is suggested to them. Those who make the suggested submissions received detailed feedback, which improves the quality of their final paper.

Table 2: Outline of submissions providing possibilities for feedback

1. Problem formulation - submit end of Week 3
1.1 Problem statement (2 pages) - include a brief review of the literature relevant to the problem and an explicit statement of the research question(s) to be answered
1.2 Statement of hypotheses (and model if appropriate), along with reference to any supporting literature
1.3 Annotated bibliography of at least 5 relevant references. At least 2 of these references must be more recent than 1998
2. Research Design - submit end of Week 6
2.1 Description of the research design
2.2 Explanation of why this design was chosen
3. Final submission - submit Week 15
3.1 Problem statement
3.2 Brief review of the literature relevant to the problem
3.3 Statement of research question
3.4 Statement of hypotheses (and model if appropriate)
3.5 Description of the research design including an explanation of why this design was chosen
3.6 Presentation of results
3.7 Discussion of results
3.8 References

EXAMPLE PROJECTS

This section describes several successful projects as examples of the scale of project that can be used. Each of the projects completed so far has been related to end user computing. Whilst students may not have formally studied end user computing in their undergraduate studies it is a concept with which they are familiar and which does not require much prior theoretical knowledge. The first project was undertaken by the instructor and two honours students. The research question investigated was:

> 'Do end users experience higher user satisfaction using applications that they have developed themselves than do other end users using the same application?'

The research question was addressed by designing an experiment where 40 business student participants used both their own and another spreadsheet application created as part of a course they were taking. After using each spreadsheet they completed a questionnaire that measured end user computing satisfaction. During analysis the project group compared the satisfaction ratings of applications that were evaluated by their end user developers with ratings of the same application by other end users.

The results of the project were interesting as end users were found to be significantly more satisfied with applications they had developed themselves. The results of this project were published in the Proceedings of the 1998 IRMA Conference (McGill, Hobbs, Chan, & Khoo, 1998). Both of the students involved in the project felt that they had benefited from it and whilst neither continued on to undertake a PhD, both also published the research from their honours theses in international conferences.

A later project built upon the results of the initial project described above. This project addressed the research question:

> 'Does the positive relationship between system quality and user satisfaction discussed in the organisational information systems literature hold in the end user development domain?'

The system quality of the spreadsheet applications from the initial study was measured following the development of an instrument to do so. This data was then compared with the user satisfaction data from the initial study. The results of the study indicated that although a positive relationship existed between system quality and user satisfaction when the user of the application was not the developer, that relationship was not present when the user was also the developer. The results of this study were published in the Proceedings of the 11th Australasian Conference on Information Systems (McGill et al., 2000). Five of the six students involved in this project continued on to enrol in a PhD.

Both of the projects described above followed fairly closely the intention of the instructor. However this is not always the case. In one project the group had difficulty reaching a decision about what they wished to research. The students were uninterested in the tentative topic provided by the instructor, yet found it difficult to settle on another topic. Eventually (after being asked not to leave a meeting until a research question was chosen) they chose the following research question:

> 'What is the relationship between end user developer satisfaction with applications they have developed, and satisfaction with the development tools used to create the applications?'

After an instrument had been developed to measure satisfaction with a development tool, the research question was addressed via a survey of 120 business students who had recently used Microsoft Excel© to develop a spreadsheet as part of a major assignment. Satisfaction with a user developed application was found to be significantly correlated with satisfaction with the tool used to create the application. The role of experience in this relationship was also explored. The results of this study were published in the Proceedings of the 2001 IRMA Conference (McGill, van der Heyden, & Hopkins, 2001).

CONCLUSION

This paper reports on an approach to getting information systems research students started. The approach involves beginning research students undertaking a structured group research project in which the instructor is an active participant. The major purpose of this group project is to provide a gentle, supportive, very structured introduction to information systems research. This approach benefits students by ensuring that they have participated in a complete research project before they have to assume complete responsibility for their first large individual project. In general, students have participated well, learning from their own experiences and the experiences of others in the group. Whilst the individual papers produced by students at the end of the project have not been of publishable quality, many of the students have gone on to publish the results of their honours projects, something that occurred very rarely prior to students participating in this kind of a project.

ENDNOTES

i For examples see:
http://cisnet.baruch.cuny.edu/phd/U821.htm
http://cisnet.baruch.cuny.edu/phd/U822.htm
http://infosys.massey.ac.nz/papers/pn/157720.html
http://cis.gsu.edu/~drobey/syl9300_new.htm

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