Dynamic Data Analysed: The SECS & IS Poster Results

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ABSTRACT

This paper reports back to NACCQ2003 the results obtained from the SECS & IS dynamic poster displayed at NACCQ2002. It appears that majority of computing academics who participated regard themselves as teaching in the core overlapping areas of Software Engineering (SE), Computer Science (CS) and Information Systems (IS), regardless of their professional affiliation. Most participants positioned themselves in IS subjects; very few positioned themselves in the exclusively CS or SE areas, or in the SE/CS overlap.

Keywords

Information Technology, Tertiary Educators, Qualitative Research

1. INTRODUCTION

There are so many different terms being used to describe the fields of Computing and Information Technology it is difficult for many to determine what is meant by each of the different areas. It is also confusing to as to whether these terms encompass the whole of this new discipline or just one area within it. There is also the difficulty in determining the differences between development and end-users and are they both part of an overall larger discipline or two different discuiplines. Given that there are three main terms to encompass the overall field in common use, Information and Communications Technology (ICT), (sometimes referred to as Information and Comouting Technology), Computing and Information Technology (CIT) and just Information Technology (IT) attention was turned to the core areas with the overall field. The three core overlapping areas of Software Engineering(SE), Computer Science(CS) and Information Systems(IS), were identified and it was decided to survey computing academics as to their perceptions of their own area and the area in which they now teach.

Data for this qualitative participatory research project was gathered at the NACCQ conference in Hamilton in , 2002 from participants(75/180) at a dynamic poster session. Overlapping circles on the poster (figure 1) represented teaching areas in Information Technology.

Results obtained from the survey gathered from 30/75 participants suggests that they regard themselves as teaching in the core overlapping areas of SE, CS and IS, regardless of their professional affiliation. Most participants taught subjects that lay within the IS and very few positioned themselves exclusively in the CS or SE, or in the overlap between SE and CS.

Participants were expected to position themselves in all overlapping areas. Unexpectedly, few positioned themselves in the SE/ CS overlap.

It was very pleasing to see the sense of community that was generated by participants who took part in the research. As the poster took shape, participants displayed a sense of ownership. So the opportunity to

feed the results back to the paricipants is one that helps engage all in a growing research community.

In this paper, the terms SE, CS and IS are defined, the local and global debate explored, the research methodology, data gathering, analysis, interpretation described and expected and emergent results given.

2. SE, CS & IS - DEFINING THE TERMS

SE is the application of a systematic, disciplined and quantifiable approach to the development, operation, and maintenance of software - the application of engineering to software.

CS involves the understanding and design of computers and computational processes and the understanding of information transfer and transformation. The discipline ranges from theoretical studies of algorithms to practical problems of implementation in computational hardware and software. In CS there is an inherent intermingling of the theoretical concepts of computability and algorithmic efficiency with the modern practical advancements in electronics that continue to stimulate advances in the discipline. It is this close interaction of the theoretical and design aspects of the field that binds them into a single discipline.

IS apply information to organizational needs and studies information production, flows and use within organizations. IS makes extensive use of information technology and also encompasses systems in their entirety including manual activities, the interface between manual and automated components of systems, design aspects of information technology and economic, legal, organizational, behavioural and social aspects of systems.

These definitions show that the three disciplines overlap. IS overlaps with both CS and SE in database management. SE software development overlaps with CS, and SE overlaps with IS business-related disciplines.

The mindsets adopted in the fields of SE, CS and IS are the main distinguishing factors. SE is located within engineering that encompasses management, evaluation and measurement.

CS mindsets encompass innovation, ingenuity and scientific principles applied to extending the power of electronics. The IS mindset covers practical applications of CS and management and design principles of SE that are applied problems, situations and environments in business and IS puts the theory and management principles to work in the world.

Polytechnics were established to provide higher education that could be applied directly to a working world and polytechnic computing staff regard themselves both as educators and practitioners in the larger arena of IS.

3. THE LOCAL AND GLOBAL DEBATE

'An increasing trend sees educators in cognate computing disciplines grouped in schools in Information Technology (IT). '(Buchan,Clear,&Hughes,2002) Whilst Buchan et al maintain that IT is an inherently murky term, an integrated approach to computing curriculum in polytechnics is adopted here.

Denning (2001) identifies over 40 IT professional specialties, characterizing them as IT-specific (CS and SE) IT-intensive (such as E-commerce and MIS) and IT-supportive (such as network technician and DBA). This is an industry professional point-of-view rather than the computing-academic-viewpoint adopted here. IT education spans traditional boundaries of CS, SE and IS and provides a common core of capabilities and knowledge.

Orlikowski and Iacono (2001) nominate four different 'views' of IT - tool, computational, proxy (IT represented as a set of measures) and ensemble view - IT 'technology as development process'. These views of IT cross the traditional discipline boundaries in this paper.

Buchan et al. (2002) conclude that it is important to address the 'chasm' that separates computing - the discipline from the IT profession. Computing the discipline includes the design of interdisciplinary programs. Such programs need to be developed in alliance with industry partners.

3.1 The Local Debate

New Zealand polytechnics generally teach computing in a single department across many academic levels - as opposed to the traditional single university departments of SE, CS and IS.

4. THE RESEARCH METHODOLOGY

The qualitative participatory research adopted allowed for a small number of responses, informal conversations and guided placement choices on the poster board (figure 1) and curriculum -area decisions.

The poster session was conducted over one day at NACCQ2002 where the data was gathered. As

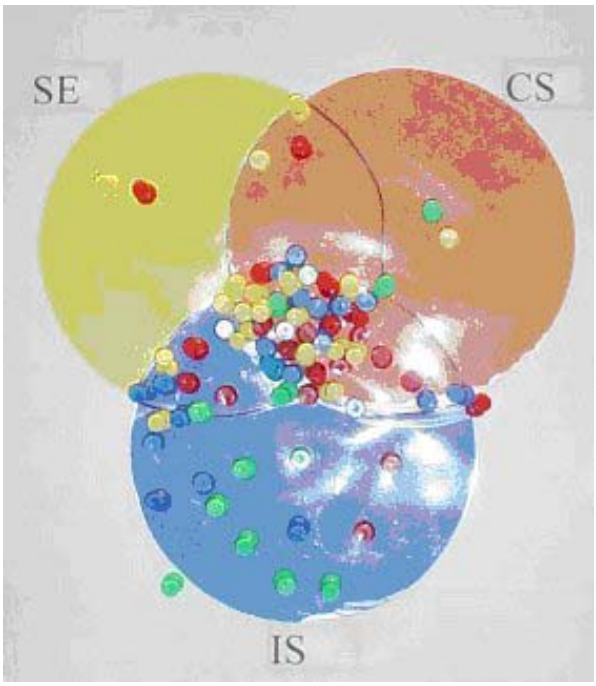

Figure 1: Your Position as IT Professional

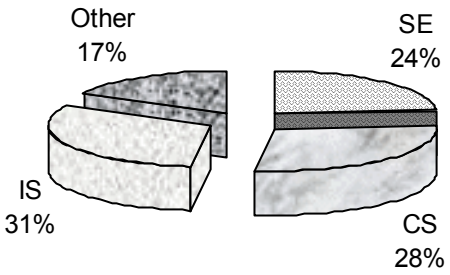

Figure 2: Profession

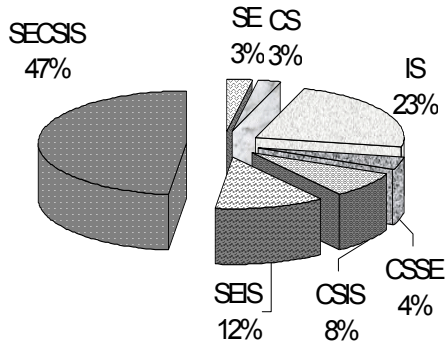

Figure 3: Teaching area

conference delegates visited poster sites, they were invited to choose a coloured pin - yellow for SE, red for CS, blue for IS and green for 'other'. The 'other' pins allowed for polytechnic computing educators from other discipline areas.

Delegates placed their coloured pin on the poster in the area in which they taught, usually after a discussion with the author. As the day progressed it became clear that the core area in the overlapping circles of SE, CS and IS was becoming very crowded. On reflection it would have been better to allow a larger intersecting space on the poster.

There were also repeated visits from delegates who had participated earlier in the day. They were interested to view the changing picture displayed on the poster. Those who participated in appeared to feel a sense of ownership of the poster.

4.1 Observed Patterns from the Poster

It can be seen from Figure 1 that the common ground is indeed IS for this sector of computing academia. Regardless of professional background, 68% of participants had positioned themselves in an overlap area with IS. The common ground was, in the first instance the core overlap area with the three disciplines and in the second place with IS/SE and IS/CS.

Figure 3 shows the distribution of professionals across the discipline areas including overlaps.

Of all the participants, 18 people considered themselves to be Software Engineers, 21 Computer Scientists and 23 Information Systems professionals (Figure 2). The 13 'others' came from a wide variety of professional backgrounds including mathematics, zoology, communication, physics, history, chemistry, engineering and fine arts.

4.2 Survey Results

By the end of the conference 40% (30/75) of those placing pins on the poster also returned survey sheets.

4.3 Common Factors

Survey results were analysed to identify common ground rather than differentiating factors (Table 1).

Note: The discrepancies in number of responses in the following tables are because some respondents nominated more than one answer to each question. All such responses were included in the results. Whilst this is not strictly correct, statistically, it is important to remember that this is qualitative research.

Table 1: What do you see as the common factors on the three discipline areas?

Common Factor	No
Working with IT	9
Working with people, BIS	9
Tools, techniques, S/ware dev	8
Integrated knowledge, skills & experience	4
Best practice, planning	2
Imagination and ingenuity	1

Table 3: How would you differentiate yourself from the other two professions?

Differentiating Factor from Other Disciplines	No
Main interest	8
Level of detail	6
I don't differentiate myself	5
Applied Information technology	4
Useability	3
No answer	3
Industry Experience	2

Table 2: What are the differentiating factors in the three discipline areas?

SE	CS	IS	General
Development **6**	Computer Infrastructure **10**	Organizations, People **8**	Level of activity, Abstraction **7**
HCI **3**	HCI **1**	HCI - high level **2**	Specialities **4**
Management **4**	More Focus **1**	Mgmnt, SA & D **6**	
End product **1**	Algorithm, Code **3**	Methodology **2**	
More Theory **2**	More Theory **3**	Multidisciplinary **1**	
	Other **2**		

4.4 Differentiating Factors

Factors that differentiate the three discipline areas are shown in Table 2.

These responses indicated that regardless of the individual's professional area, it appears that there was clarity on what the differentiating factors were in the three discipline areas.

Table 3 shows how participants differentiated themselves from the other two professions.

Conclusions from this question remain unclear. While respondents could differentiate the discipline areas, they had much difficulty identifying their personal position. When the responses were grouped according to the discipline area (figure 1) the only people who felt they could not differentiate themselves were in the overlap areas. It was only those who taught in either IS or CS who could differentiate themselves from the other two professions. On reflection, this suggests that it is the common ground in computing that is recognized first, rather than the differentiating factors.

Only people placing themselves in the IS circle (and this includes the overlap areas) identified themselves as teachers within the profession whose main aim was to produce quality graduates. It is interesting to note that quality, improved skill, and professionalism were nominated by 26 of the respondents, regardless of the discipline area. These factors would appear to be important common ground.

4.5 Core Curriculum Areas in Your Discipline Area

Figure 4 indicates core curriculum areas with programming and hardware considered to be the most important in the overlap of all three discipline-areas. Analysis, design and business process were considered core in the IS only area. Software specification, design and implementation in the software/Information Systems overlap; operating systems in the SE/CS overlap; and multimedia and the Internet in the IS/CS overlap.

Table 4: What would you see as the main aim in your professional field?

Main Aim in Your Professional Area	No
Deliver quality software to business	10
Improve skill levels	6
Produce professional graduates	6
Improve professionalism and quality	4
Merge software engineering, computer science and information systems	3
No Answer	3

Table 5: How Do You Rank the Importance of the Three Discipline Areas?

Ranking Order	No
All areas ranked equal	15
IS 1st, SE 2nd, CS 3rd	5
CS 1st, SE 2nd, IS 3rd	5
IS 1st, CS 2nd, SE 3rd	4
CS 1st, ISs 2nd, SE 3rd	2
IS	1
Other	2
No Answer	3

When the CS/SE overlap is considered from figure 1, it is evident that there is a lack of academics actually teaching in this area.

Table 5 shows how respondents ranked the importance of the three discipline areas(Table 5).

Figure 1 shows that the 69/75 placed themselves in the IS area. This supports the ranking from the survey. The ranking of IS as equal or first is indeed the common ground.

Table 6 shows which area was considered the most important input to industry (Table 6).

5. IMPLICATIONS

This research has highlighted implications for curriculum design, alliance with industry, staff recruitment and retraining as well as the need for a solid curriculum in core topics in the polytechnic sector of higher education. From this survey it appears that there are fewer academic staff teaching in the core curriculum areas in the CS/SE overlap area and the SE/IS overlap area. It also appears that most participants are within the overlapping region and it is these participants that are most in demand in this sample.

Table 6: Which area do you regard as most important to industry?

Area Most Important to Industry?	No
IS	14
All areas equal	5
SE/IS	2
SE	1
CS	1
Training graduates	2
No Answer	3

5.1 Curriculum design

These participants saw the continuing need for a compulsory core of computing subjects. Participants saw themselves as capable of teaching in the core area regardless of original professional background. Integrated computing expertise rather than theory was seen as more important. Conversations held with participants during the data-gathering exercise indicated that students could limit their choices by opting for the 'flavour of the month" computing topics in favour of necessary core topics which could limit their employment options.

5.2 Alliances with industry

The polytechnics have active involvement with industry through advisory committees and capstone projects, while regular reassessment of curriculum ensures its alignment with industry requirements. This was reinforced in conversations with participants.

5.3 The computing common ground

Data gathered from participants indicated that participants saw themselves as computing professionals first and members of a particular discipline area second. Even those people who had 'other' professional areas considered themselves to be computing academics. This was reinforced by the number of participants placing their teaching area within the core overlapping areas in figure 1, by the number of survey responses seeing commonality before differentiation in the disciplines.

6. CONCLUSION

This paper has described the SECSIS dynamic poster (NACCQ2002) in which polytechnic staff positioned themselves both within their chosen profession and their teaching area. The research was 'opportunistic' and participatory. Data was gathered from poster, survey and informal discussions and observations. This research also added to the dynamic nature of the conference and results are limited only to this particular sample of computing academics.

Common ground was discovered in the teaching curriculum areas in the core overlap between the three discipline areas of SE, CS and IS with most academics positioning themselves within IS. Participants considered themselves to be computing professionals in academia rather than belonging to SE, CS or IS. It appears that this set of academics have an integrated worldview of computing with clear perspectives on core computing curriculum.

The results of this research form the basis of a continuing research project that could be widened to include academic staff from universities and also practicing professionals. It would also add to the diversity of the research to include students studying towards a "computing" degree to ascertain their perceptions of the three areas and whether in fact they even recognise different areas. It will also be important to the IT profession to observe, as the industry and the discipline develops and matures, whether the overlapping sectors merge or diversify.

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