The Model IS Curriculum: Holy Grail or Mirage?

Martin Atchison
and
Christabel Gonsalvez
School of Information Management and Systems, Monash University,
Melbourne, Australia

Abstract

This paper critically analyses the relevance and usefulness of model IS curriculum such as IS'97. It argues that the evolution of IS as a discipline has now rendered model curricula of this type obsolete, and suggests the basis for a new approach to model curriculum development, which is more in keeping with the needs of the discipline.

Keywords: Information systems education, curriculum, information systems curriculum, model curriculum, IS97

1. INTRODUCTION

Since the early days of the development of Information Systems (IS) as a discipline, much attention and effort has been devoted to the task of developing a model undergraduate curriculum to prepare practitioners for professional practice. This paper critically analyses the viability of a model IS curriculum and suggests that the approach to model curriculum development is in need of revision.

The paper begins with a brief overview of the development of model curricula, culminating in the current curriculum model, IS'97. It briefly examines some of the key characteristics of IS as a discipline, which sets the scene for a critical review of the value of a curriculum like IS'97. The paper concludes with suggestions for change in the way in which future development of model curriculum should be approached.

2. THE DEVELOPMENT OF THE MODEL I.S. CURRICULUM

The development of a standardised model curriculum for teaching undergraduate programs in IS has been regarded as an important objective since the birth of the discipline. Progress towards achieving one has been seen as a significant means for unifying the discipline and for providing substance to its claims for support and resources as a reputable academic discipline (Couger et al, 1995).

The earliest proposals for a teaching program geared to meet the needs of IS professionals appeared in 1973, in association with developments of a model curriculum for Computer Science. Throughout the 1980s and early 1990s, regular revisions of competing versions of an academic program were produced by the Association of Computing Machinery (ACM) and the Data Processing Management Association (DPMA) (now the Association for Information Technology Professionals (AITP)). Eventually the two groups joined forces, and with support from the Association for Information Systems (AIS) combined their efforts to produce IS'95 (Couger et al, 1995) and its subsequent up-grade, IS'97 (Davis et al, 1997). (For a full outline of all the key events in the development of this curriculum, see Appendix 2 of Davis et al, 1997).

The main component of the model curriculum which has emerged form this process is a very detailed specification of ten courses incorporating the content deemed to be core to an IS undergraduate program. These courses comprise groupings of 127 separate learning units which are drawn in turn from a much larger number of elements which are said to constitute the basic body of knowledge for the IS discipline. The depth of knowledge which a student is expected to achieve is specified for each learning unit. The report gives some guidelines for compressing this content to suit IS minor sequences, but the main emphasis is on defining the core of a full IS major or IS degree.

It is important to note that the main focus of the curriculum is on the specification of the courses and learning units. It provides some general rationale for the choice of learning units, but this is confined to a broad specification of the generic characteristics, abilities, knowledge and attributes expected of IS graduates. There is little or no discussion of the way in which the curriculum content contributes to the achievement of these desired at-

tributes, or of the way in which these attributes in turn contribute to professional career outcomes.

It should be stressed that the work on the development of this model curriculum has attracted enormous support within the IS community. Throughout its evolution, the curriculum has been a valuable resource for all IS educators, not only for its specific recommendations on curriculum content, but also for the way it has provoked thought and discussion about what elements are central to the discipline.

We feel, however, that the IS discipline has now reached a stage in its evolution where a model curriculum like this no longer provides adequate solutions to the problem of what we should be teaching undergraduate students. In fact it highlights the key problems associated with the very concept of a model curriculum as the basis for educational programs in IS.

This paper aims to question the value of the format adopted in a model curriculum such as IS'97. It further suggests that the model curriculum structure and content need to be radically revised. Model curricula of this type may have been appropriate in the early days of the evolution of IS as a discipline, but they are now more likely to hinder the development of the discipline than to promote it. In order to set the basis for these criticisms and for our views on how it should change, it is necessary first to make some observations about the nature of IS as a discipline.

3. I.S. AS A DISCIPLINE

The need for IS as a field of study grew out of the application of technology to help businesses meet their information needs. Therefore from its very beginnings, IS has found itself in the uncomfortable position of lying at the intersection of other disciplines - a position in which uncertainty and disputes over academic territory are inevitable. As the field has evolved, further overlaps or intersections with other disciplines (sociology, psychology, management, behavioural science, and so on) have emerged. At the same time the increased usability and almost universal adoption of information technology has led to the widespread absorption of aspects of IT and IS into many other disciplines. This has intensified the confusion over what constitutes IS as a field of study.

The range and diversity of the disciplines which interact with IS is reflected in the variability of the backgrounds of the community of people who profess to be practitioners and academics in IS. This variability of backgrounds acts as both a blessing and a curse. The blessing comes from the variety of content, and the great variety of perspectives they bring from the wide range of reference disciplines from which they come. The curse is that this proliferation of content and perspectives exacerbates the difficulties involved in establishing a common basis for IS.

The effect of this uncertainty and diversity has been to create an on-going debate over the place of IS as a discipline. This debate began at the birth of the discipline, has gone on ever since (see, for example, Checkland & Holwell, 1998), and will no doubt continue to do so for some time to come. In trying to find and assert its place, IS has been, and will continue to be caught between somewhat contradictory aims. On the one hand it strives to continue to draw on its wide range of related reference disciplines and to assert the relevance and importance of its connections to each of them. Simultaneously, however, it tries to assert its independence from these other disciplines, and to protect its status as a separate and independent discipline by emphasising the characteristics which distinguish it from them.

It is important that any model IS curriculum should adequately reflect the diversity of the discipline as well as its unity. In its present form, IS'97 appears to overemphasise the need for coherence and unity at the cost of supporting diversity. IS academics should not judge the need for coherence of the discipline more severely than is done for other disciplines. There is a danger that their desire to demonstrate the disciplinary unity of IS may lead them to impose standards on curricula which are stricter those used by other disciplines. In this light it is useful to examine briefly how another discipline copes with diversity, and look at how it deals with the problems this creates for curriculum content.

4. AN INTER-DISCIPLINARY COMPARISON

Although IS prides itself on the breadth of the discipline and the extent of its interaction with other disciplines, it is not alone in either regard. Other disciplines also have to deal with extreme diversity of content and extensive inter-relationships with other disciplines. It is dangerous to go too far in drawing comparisons with other disciplines and professions, but some useful lessons can be learned from the way they deal with similar problems.

Consider, for example the case of engineering. A degree in engineering encompasses a wide range of sub-disciplinary specialisations - civil, electrical, mechanical, mining, chemical, industrial. Each of these sub-disciplines sub-divides further; for example, civil engineering has specialist streams in structural engineering, hydraulics, transport engineering and so on. Practitioners within these different streams may specialise still further; for example a structural engineer may be a specialist in different types of construction material (concrete, steel, timber), in different types of built objects (office buildings, reservoirs, bridges), in different aspects of construction (planning, project management, design) and so on. Virtually the only feature common to all the branches of engineering is that they involve the construction, operation and maintenance of some built physical artefact.

As with IS, the engineering discipline also interacts with a range of related reference disciplines. These related disciplines, and the nature and extent of the interactions with them vary significantly from one engineering sub-discipline to the next. For example, even within the single sub-discipline of civil engineering, the related disciplines and their interactions for a structural engineer (architecture, building, materials science) are clearly different from those which are relevant to a transport engineer (town planning, surveying, cartography).

Without wishing to push the inter-disciplinary comparisons too far, we believe that a similar case can be made across most, if not all disciplines. Whether the amount of diversity within IS and the range of disciplinary inter-relationships with which an IS practitioner has to deal is greater than it is for other professions is a matter for debate, but it is immaterial to this paper. The issue which is of interest is how this diversity and complexity is catered for in a disciplinary curriculum.

The engineering programs in most Australian universities, have a relatively small generalist core component and then a range of the sub-disciplinary specialisations in the different branches of the discipline. The number and type of sub-disciplinary specialisations offered by an institution vary according to the availability of resources and the levels of student interest. The core content-based components of the curriculum studied by all students are usually confined to the first year of the degree. From this point on, students' programs diverge as they choose from the different sub-disciplinary specialisations which are on offer, selecting the one which best fits their interests, skills and career aspirations. Some attributes and areas of knowledge believed to be core to all engineering sub-disciplines continue to be taught to all students, but they are inter-woven with the specialist content of each sub-discipline.

Developers of IS curriculum can learn some useful lessons from the way in which this approach to curriculum design supports multiple diverse sub-disciplinary streams which cater for different applications and career outcomes. We believe that some of the features of this approach should be adopted as part of a revised approach to the development of model IS curriculum. Obviously it would be unrealistic to expect that such a model for IS could be adopted and implemented in practice in the same way as is done by engineering schools. There are few, if any, parts of the world where IS is a sufficiently well-established, strong, popular and well-resourced discipline to be able to afford to offer multiple curriculum streams to students in the way that the engineering discipline does. However we believe that to expect widespread adoption and implementation of a curriculum like that contained in IS'97 is also unrealistic (though for different reasons). The following section of the paper briefly examines some of the problems from which a model curriculum like IS'97 suffers, before considering how a revised format could improve on it.

5. PROBLEMS WITH THE MODEL CURRICULUM

The ostensible outcome of a model curriculum like IS'97 promises some attractive benefits. For example:

- standards: it provides guidance to teaching institutions about what they should be teaching in their IS programs;
- unity: it provides a focus which brings together the academics in the discipline;
- consistency: it encourages a greater level of consistency in educational content and sets a base for comparing the IS programs at different institutions;
- efficiency of delivery: it facilitates the development of a pool of resources which can be shared between teaching institutions

However, the lure of these potential benefits should not blind us to the problems inherent in the concept of such a model curriculum. The following discussion briefly outlines two of the most critical:

(i) Course Philosophy and Orientation

In the light of the discussion earlier in this paper about the diversity of the elements of IS, it is clear in our view, that no single IS curriculum can possibly cater adequately for the range of content which the discipline encompasses or the range of disciplinary perspectives with which that content can be viewed.

In terms of range of content, the problem is identical to that described above for the engineering profession - no matter how much you may want to teach all the sub-disciplines, there is too much content in each to enable you to cover them adequately in an undergraduate program. Any IS curriculum must make hard choices about what content it will try to cover and to what depth it can cover it. These choices must involve the omission of some content or some detail which is desirable but cannot be fitted within the confines of the time available. Attempts to include coverage of all aspects of the discipline within one program must invariably lead to reductions in depth of coverage. When new content is incorporated into a curriculum, room has to be made for it by removing or compressing something else. To paraphrase an old joke, the curriculum must find a compromise between teaching the students everything about almost nothing or teaching them nothing about almost everything.

The problem involved in catering for the diversity of perspectives is a little more subtle but is equally significant. There are many different perspectives which can be brought to the study of IS,

ranging from those with an engineering-based technical orientation, through those with a business-oriented organisational orientation, to those with a human-factors-based sociological orientation. Approaches to the teaching of aspects of IS range across this spectrum, and may involve a blend of a number of perspectives (see, for example, Hirschheim & Klein (1989) for a good illustration of the way in which problems in IS development can be approached from any one of a wide variety of orientations). Ideally an IS curriculum tries to incorporate a range of these perspectives to give students an awareness of their merits and deficiencies. An infinite number of orientations is possible, and a key element of any curriculum design should be the decisions about the nature of the orientation which the curriculum will take to the presentation of its content.

Almost any discussion of curriculum with any group of IS academics provides ample evidence of the variety of viewpoints which are held about the question of which content and perspective should be adopted in the teaching of IS. In our experience these discussions invariably lead to disagreements which reflect the varying disciplinary backgrounds of the participants, the different views which they have of the discipline, and the student career outcomes which they wish to support. A similar variety of opinions emerges from a content analysis of IS textbooks, or from a simple comparison of IS'97 with some of the other model curricula for information professionals (for example Cohen, 2000 and OSRA, 1996).

In our view, such breadth and diversity of content and philosophical orientation is integral to the discipline. The danger of a strongly content-oriented model curriculum like IS'97 is that it may become a disciplinary straight jacket which discourages diversity of views and approaches. Not only does this rob the discipline of one of its great strengths but it also creates the danger that the discipline will be seen to be losing its relevance to many of the potential employers of its graduates.

(ii) Course Content and Structure

Aside from problems of course philosophy and orientation, a content-oriented model curriculum also runs into significant problems in terms of maintaining the relevance and appropriateness of its content and structure.

It is a truism that the IS discipline has to cope with constant rapid change. The comparative immaturity of IS as a discipline, and the strength of its inter-disciplinary connections mean that these forces of change are many and varied. They include: changes in technology; changes in the business usage of IS; changes in business and economic environments; changes in societal attitudes to information; changes in the expectations and role of IS; changes in IS theory. To complicate matters still further, all these changes are taking place at different rates and in different ways in different industries and across different communities.

The systemic interactions between these changes makes the picture even more complex. It is difficult enough to keep track of the changes within any one area of the discipline and assess their implications for a curriculum which focuses solely on that area. To maintain a curriculum which reflects the trends in all these areas and the interactions between them is impossible. (The impact on curriculum of the fluctuating fortunes of the e-commerce boom of the last few years would make an interesting case study of this point).

A content-based curriculum model tries to freeze at a given point of time the state of a discipline (and its related reference disciplines) which are in a permanent state of flux. The net effect of the rate and complexity of change in so many aspects of IS is to make it impossible for a single content-based curriculum model which tries to incorporate all facets of the discipline to keep pace.

The IS'97 report itself acknowledges the problem of maintaining curriculum content, and comments on the need for it to be frequently up-dated in order to remain effective. It proposes to deal with the problem by speeding up the process of revising and up-dating the model curriculum to maintain its currency. In our view, this is an impossible task. If a model curriculum is to be developed and specified in the form of IS'97, then no revision/up-dating process can possibly cope. Rather than trying to keep doing the impossible, it is time to change the approach to the curriculum model.

These problems and criticisms of content-based model curricula are not new and have been voiced by many IS academics in a variety of contexts. As far back as 1987, they are implicit in the approach adopted by one of the early models of IS curriculum (Buckingham et al, 1987); in 1993, extensive surveys of industry expectations of IS practitioners led Trauth et al (1993) to conclude that "…No longer can one individual or a single curriculum be all things to all people"; and in 1996, contributors to an Australian forum on IS curriculum expressed a variety of concerns about the ability of IS'95 to reflect the range and diversity of IS in a single degree program (Arnott et al, 1996). The difficulties involved in creating a single unified model of an IS curriculum have continued to worsen, and we believe that it is time to rethink the role which a model curriculum can play and the form which it should take in order to play it effectively.

6. WHERE TO NEXT FOR THE MODEL CURRICULUM?

In our view the concept of the model curriculum embodied in IS'97 is no longer a holy grail but a mirage. It is no longer possible for a single degree program to incorporate adequate coverage of the full range of content of the discipline in one degree program. Nor is it possible for one program to prepare students for employment in the full range of career outcomes for information professionals.

It is a sign of the increasing maturity of IS as a discipline that it has reached this point. It is now close to forty years since the birth of IS as a field of study (Davis et al, 1997), and thirty years since the field grew large enough to warrant a curriculum of its own, separate and distinct from its Computer Science parent. It is hardly surprising that IS has itself now become too big and too diverse to fit into one degree program.

Within the IS discipline, the aim of the process of model curriculum development should not be to try to shoehorn all of IS into a single degree program, but to stimulate discussion and further understanding about the diversity of the discipline and the varied career outcomes to which an IS professional may aspire. It should also aim to highlight the contributions which different philosophical orientations can make to the preparation of future IS professionals. The desired final outcome should be the development of a range of academic curricula which may differ markedly from one another and which reflect the diversity of the discipline and its professional outcomes.

A model IS curriculum developed to meet these aims would have features in common with those of the engineering curriculum model described in section 4. It would include a relatively small set of generic core skills and competencies which are seen as relevant to all practitioners of IS, on top of which rest a set of diverse sub-disciplinary streams which explore in depth specialist aspects of the discipline (in terms of either content or orientation). The curriculum model proposed by Buckingham et al (1987) provides an interesting example of a starting point of such a model. As mentioned earlier, few IS departments would have sufficient resources to support the range of sub-disciplinary streams which are supported by the typical engineering school; for some departments one stream would be as much as they could handle. However, this would in fact serve to benefit small schools which could select and focus on the sub-disciplinary specialisations which best suited their resources and staffing constraints, rather than having to maintain expertise across the broad range of aspects of IS which are included in IS'97.

An example of the implementation of such an approach to the management of computing curriculum as a whole is already in place in our own faculty at Monash University in Melbourne, Australia. Here, within a Faculty of Information Technology, a range of degree programs has been developed which caters for different specialist interests. They include technical degrees (Bachelor of Computer Science, Bachelor of Digital Systems), business-oriented degrees (Bachelor of Business Systems) and information-oriented degrees (Bachelor of Information Management and Systems). Acknowledgement of the extent of the overlap of computing with other disciplines has been expressed through the development of joint degree programs - a Bachelor of Electronic Commerce with the Business faculty, a Bachelor of Multimedia with the faculty of Art and Design, and a Bachelor of Software Engineering with the faculty of Engineering. The implementation of this model is still far from complete. The evolution of the portfolio of IT-related degrees is on-going, and the allocation of content between them is in a state of regular review. However we believe that the principle behind this approach to structuring IT programs is sound, regardless of the specific details of the implementation. It shows the way forward to catering for diversity of content in course curricula.

In extending this approach to address specifically the IS discipline, the first objective for establishing a model IS curriculum should be seen as the establishment of an overall curriculum framework. This framework should be used to explain the context for the diversity of views and approaches which different IS departments and different parts of the discipline have taken to the education of future information professionals. Once the framework is in place it will be necessary to identify the curriculum elements which are felt to be common to all IS educational approaches, and which should constitute the fundamental core of all IS programs. This will clearly be a much smaller set of elements than is currently contained in IS'97. The development of specialist curricula should flow from this core.

An interesting example of the use of a similar approach to dealing with the same problem in IS research can be found in Hirschheim et al (1996). Their paper proposes a taxonomy of approaches to IS research which it suggests can provide an explanatory framework for the different streams of IS research, and can act as a vehicle for practitioners to conceptualise research issues and identify future research directions. We believe that a similar taxonomy is needed for IS education, and the IS model curriculum should provide it.

7. CONCLUSIONS

There is no doubt that many positive features have emerged from the on-going debate which has accompanied the initial establishment and subsequent revisions to the various IS model curricula. Their development has generated much-needed interest in the educational

needs of prospective IS practitioners, has provoked much useful comment and discussion, and has provided a focus for research into practitioner needs and educational philosophy.

However, useful as they have been in the past, model curricula such as IS'97 are no longer the best way of furthering the development of IS education programs. Future model curriculum development efforts should avoid the detailed specification of curriculum content for a single degree program, and should direct their efforts toward establishing a broad curriculum framework to support multiple sub-disciplinary specialisations.

8. REFERENCES

Arnott D, Dampney C, Scollary A (1996) *The IS Curriculum Debate: The Australian Perspective*, Monash University

Buckingham RA, Hirschheim RA, Land FF, Tully CJ (1987), *Information Systems Education: Recommendations and Implementation*, Cambridge University Press

Checkland P, Holwell S (1998) *Information, Systems and Information Systems - Making Sense of the Field*, Wiley & Sons

Cohen (2000), Curriculum Model 2000 of the Information Resource Management Association and the Data Administration Managers Association, accessed on 15 June, 2001 from http://gise.org/IRMA-DAMA-2000.pdf

Couger JD, Davis GB, Dologite DG, Feinstein DL, Gorgone JT, Jenkins AM, Kasper GM, Little JC, Longenecker HE, Valacich JS (1995), IS'95: Guidelines for Undergraduate IS Curriculum, *MIS Quarterly*, September

Davis GB, Gorgone JT, Couger JD, Feinstein DL, Longenecker HE (1997), *IS'97 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems*, Association of Information Technology Professionals

Hirschheim RA, Klein H (1989), Four Paradigms of Information Systems Development, *Communications of the ACM*, Vol 32, p1119-1216

Hirschheim R, Klein HK, Lyytinen K (1996), Exploring the Intellectual Structures of Information Sysatems Development: A Social Action Theoretic Analysis, *Accounting Management and Information Technology*, Vol 6 No 1/2

OSRA (1996), Organisational and End-user Information Systems Curriculum Model, accessed 15 June, 2001 from http://pages.nyu.edu/~bno1/osra/model_curriculum

Trauth EM Farwell DW Lee D (1993), The IS Expectation Gap: Industry Expectations Versus Academic Preparation, *MIS Quarterly*, September