

Information Systems Textbook Design for South Africa

G.J.Erwin

Information Systems & Technology Department, Faculty
of Commerce and Administration, University of
Durban-Westville, Private Bag X54001, Durban, 4000,
South Africa.

Phone: (W) +27 (031) 204-4435 Fax: (W) +27 (031)
204-4300 e-mail: erwin@is.udw.ac.za

C.N. Blewett

Business Information Systems, Faculty of Economics
and Management, Department of Accounting and
Finance, University of Natal, King George V Ave.,
Durban, 4001, South Africa.

Phone: (W) +27 (031) 260-2161 Fax: +27 (031) 260-
3292, e-mail: blewett@bis.und.ac.za

Abstract

Changes in South African politics and society since the election of Nelson Mandela as President of South Africa in the first democratic election in April, 1994, have brought about changes in the background of student audiences. This has stimulated a review of the areas of governance, syllabus, curriculum, teaching methods and research in educational institutions. In this paper we describe the first-year textbook which we created to match these changes with an Information Systems textbook which meets South African needs, rather than echoes the technology and methods of developed countries. We discuss the "product-driven" and "problem-driven" arrangements of current textbooks and summarise a survey of Information Systems students using the textbook. We discuss problems with non-South African textbooks and describe some of the features of an Information Systems course designed locally. We conclude with recommendations on teaching methods, textbook design and support material which are appropriate to a developing country such as South Africa.

1. Introduction and Background

“There are ever-fewer white students and the trickle of Africans has become a flood. Universities (*et al*, added by authors) must adapt to the needs of a new and very different clientele.” [7].

The student audiences at, for example, University and Technikon, in South Africa are rapidly changing. Moulder discusses how the change in student audiences requires us to:

1. alter the “composition of student, academic and administrative bodies”; the *governance* structures of our institutions.
2. change the *syllabus* by moving away from “geriatric, northern hemisphere cultures”.
3. change the *curriculum*, “the whole way in which teaching and learning are organised”.
- and
4. change the “criteria (for) *research*”.

In other words, Moulder is summarising the areas of attention for the transformation of educational efforts [7]. Since 1994, major changes in all four areas have taken place. For example, the University of Durban-Westville over 65% of its enrollment is African, compared with 2% five years ago.

This paper describes work we have done to address the *syllabus* issue, with our textbook [4], and the *curriculum* issue, by reshaping the presentation of Information Systems to be *problem-driven*, items 2 and 3 above. We begin by describing the design of current Information

Systems textbooks, and the problems which students face using foreign textbooks. We then present the features of our Information Systems textbook which address those problems, discuss the problem-driven approach to teaching and learning, compared with the product-driven approach, and, after reporting on a survey of Information Systems students using our textbook, draw some conclusions about the success of the textbook and the problem-driven approach. These issues also apply in business, and at primary/ secondary schools, but, this paper does not address those areas, except in passing.

Many new students will be and are educationally disadvantaged, under-prepared and unprepared. For example, Crossman *et al* report that they still register students for their Business Information Systems courses “who have lived their whole childhood in homes without electricity” [2]. These students come from very different backgrounds to previous entrants to our tertiary institutions. The growing penetration of sectors of our society by Information Technology (IT) means that such students will encounter courses in subjects such as Information Systems (IS) and Computer Studies. Many of these students “are studying in a foreign language” [7]. Teaching methods and materials are under review by many educational institutions.

2. Notes on Current Textbooks and Student Learning

Currently prescribed textbooks for Information Systems / Computer Studies courses at Universities, Technikons, Technical Colleges and other educational institutions often bear little specific relevance to South African society. They are illustrated with foreign-based examples, lack reinforcement of the material suited to educationally disadvantaged readers, and have inappropriate "chunking" and sequencing of material. Such textbooks can create learning problems for many students. Our teaching experience shows that current American/British textbooks assume certain experiences and institutions in society, leaving our students confused between fundamental material and the mechanisms of a particular society's structure. Furthermore, American/British textbooks present material in a sequence which is much more for the author's and course leader's convenience, than for the student's. Textbooks are often designed for the approval of other academics, rather than to improve the learning process of students. Academics / course instructors are already familiar with the material in a textbook. Their main concern when assessing a textbook is often the *organisation* of the material therein, rather than the *impact of the material* on the learning student. This approach does not recognise the difficulties students have with material on first meeting it.

The success of a student's learning process depends, *inter alia*, on the method of *initial exposure* to the material and progress through it without jolts or obstacles. Subsequently, after first-level comfort is achieved, there will be an (overlapping) *formal learning* stage in which a student returns to the material, for example, for examination purposes. There is a two-stage process, with much overlapping of stages, as new topics are encountered. Every topic has an initial stage, followed by a more formal stage. The initial learning stage significantly influences the outcome of the more formal learning stage. Existing textbooks have been arranged largely to suit the more formal type of student learning which occurs when preparing for exams / tests, not the *initial learning* that occurs when a student first encounters a topic.

3. Production of a textbook

We believe serious learning problems emanate from the use of inappropriate textbooks, (and other media, methods and material) and that these problems will grow substantially, unless addressed. As in any situation, there are three major options available [4]: namely, *do-nothing*, *improve existing methods*, or *adopt new methods*. In the early 1990s, we observed the mounting difficulties our students were having with IS material and teaching methods, and we decided we could not do-nothing. We could attempt to improve our existing methods and material, by piecemeal attention to many different areas, or we could go "back to the drawing board" and address

the problems we were facing by building new materials and methods. Therefore, after some months of planning and discussion with colleagues and others, we wrote and published a *new type of first-year Business Computing / Information Systems textbook* [4] to reduce learning problems associated with foreign textbooks. We incorporated our textbook into an Information Systems course using problem-driven methods. In these two ways we hoped to introduce material better suited to our actual student audience, and offer better teaching support for that student audience. In Moulder's phrase, we are "Riding the Wave", not being swamped by it [7].

4. Target Audience

We aim our textbook at 1st. Year University, Technikon, Technical College students of Business Information Systems (BIS), Information Systems (IS), Computer Studies, Information Technology, Computer Management, Business Computer Science, Business Data Processing (BDP), Commercial Computer Science, Management Information Systems, and so on. The book also caters for business people, with little or no computer experience, who wish to improve their computer literacy and want to understand the process of computerisation in a business.

5. Objectives of a Textbook

A (first-year) textbook can be constructed for one or more of a variety of objectives. These objectives include:

- to cover the field
- to be up-to-date with latest research findings
- to expose principles
- to provide drill and practice
- to encourage interest in the subject
- to cover a specific set of topics, often as a basis for professional work
- to introduce core topics in a comfortable style
- to provide a variety of (edited) sources for student growth
- to provide a reference source on fundamental topics and so on.

We believe that, at first year (and novice) level, the appropriate objective of an IS textbook is a mixture of "expose principles", "encourage interest in the subject", "cover a set of topics, ... as a basis for professional work" and "introduce core topics in a comfortable style".

Let's look at some of the problems we recognised with existing available textbooks and teaching methods, and the approach we took to address those problems.

6. Summary of Existing Problems

Here is a summary of major problems we encountered with existing textbooks. We discuss these problems and our approach in the sections that follow.

Existing Information Systems textbooks are:

- foreign: aimed at "literate", non-South African, audience.
- product-driven: they describe **how**? Often to the exclusion of **why** and **when**?
- glossy: distracting and unreal photo galleries; sophisticated applications.
- superficial: not useful for the practice of business; stop at first level, even for core topics.
- boring/dense: use passive voice; assume good literacy; back-end Appendices.
- comprehensive: distracting wide coverage of most-recent software/hardware versions.
- up-to-date: to "prove" usefulness to a literate audience as an up-to-date text.
- targeted: at the instructor, not the learning of the student.

Existing textbooks have:

- good coverage of required material
- emphasis on PCs without ignoring other types of computers
- well-organised exercises and summary material

However, in our South African situation, existing textbooks suffer from :

- inappropriate context
- inappropriate examples
- lack of reinforcement
- inappropriate "chunking" and sequencing of material
- inappropriate use of language
- poor placement of Appendices

and

- an unrealistic element.

We now consider each of those problems in turn, with the use of examples, and, after each discussion, immediately discuss our approach to each problem.

6.1. Problem: Inappropriate Context

Existing textbooks describe the society and events of a first world society, rather than our mixed first/third world society. For example, an (American) textbook on Computer Security starts off by claiming "You seldom hear of bank robberies these days!" [10]. American society has largely moved to the use of credit cards and other forms of cashless transactions. This reduces the availability of cash as a target for robbers. In South Africa, bank robberies and cash-in-transit robberies are so common that we hardly notice them anymore!

Almost all American textbooks refer to USA laws, such as The Freedom of Information Act: a law giving citizens the right to have access to data about them gathered by federal agencies; Fair Credit Reporting Act; Federal Privacy Act and so on. For example, "The major piece of legislation on privacy is the **Privacy Act of 1974 (PA74)**, enacted by President Gerald Ford." [11]. Stair is an American textbook, so, our relatively young, local, novice reader can make little sense of this sentence in South Africa, where the 'President' is currently Nelson Mandela. This example from Stair confusingly refers our students to a *foreign history* and *foreign legislation* at an *early stage* in the learning of Information Systems "Principles". South African students using Stair will learn about the issues of privacy in the confusing context of unfamiliar and (largely) irrelevant Government institutions and regulations. Material of this type is important in order to expose legal aspects of the issues of privacy and security, but the context in which such textbooks do this makes the topic very difficult for novice students. See [9] for a similar example. Our textbook, on the other hand, as one example, refers to South African issues, such as "The government may introduce new laws which require strict control of the business, such as the calculation and claiming of Value Added Tax (VAT)." [3].

Another example of inappropriate context (for South African students) is "... a new type of robot developed at the MIT Mobile Robotics Laboratory in Cambridge, Massachusetts." [11]. There are many blockages for our students here, including the "MIT", the "Cambridge", and the "Massachusetts". Moreover, in South Africa a "robot" is a **set of traffic lights**. A similar inappropriate (for South African students) example occurs in Stair [11], namely, "Researchers at AT & T Bell Labs ...". South African students have no association with such companies. Our textbook, on the other hand, uses an example such as "... rainfall figures in Cape Town help to plan the construction of a new dam." [3].

Existing textbooks also assume wide availability and accessibility of computer equipment. For example, one textbook offers a "Teaching Tip : Take off the enclosure on a microcomputer processor to expose the circuit boards. Point out the motherboard, memory, add-on boards, disk drives, and so on." [6]. This is not only unrealistic with Information Systems class sizes of hundreds, but is normally *forbidden* by institutions, and is impossible for distance teaching.

In general, the level of computer literacy, availability and personal, computer comfort in South Africa seems far lower than in the USA, Australia, Europe and UK. The content and style of a textbook needs to recognise the characteristics of its target readership, usage and society.

6.2. Problem: Inappropriate Examples

Our experience at teaching in University, Technikon, Damelin Management and Computer Schools, industry and commerce, and other institutions has shown us problems when students learn with inappropriate textbooks and examples. In textbooks, such as Capron [1], the beautifully printed picture galleries, glossy print and USA examples immediately present credibility problems for our students. The examples in books such as Capron, become a distant, almost dream-like fantasy collection when read by many of our students. Capron-type examples simply convince many students of the unmanageable sophistication and complexity of computerised applications, reducing their own confidence in being successful with computers. A confident, identifiable *start to learning* is needed. Further texts and/or study can subsequently introduce complexity and breadth.

Another example of an inappropriate example appears in O'Brien [8], p.21. The illustration (photo) for an optical scanning "wand" is of a mysterious product called "Dr Pepper". Only people who have travelled to the USA (or been very observant while watching American TV situation comedies) will know that "Dr Pepper" is a soft drink, and not a medicine or a brand of Mexican food.

A similar example appears in Stair [11], p.152, namely, "... which leads to the manager's SSN (098-40-1370) in the Department table." Many of our students have no idea what "SSN" is, so this example is much more a blockage to learning than an aid. An equivalent example in our textbook is "Another way to think of a byte is to consider *eight soccer referees*." [3].

The examples used in our textbook are *local examples*. There are frequent references to Durban, Cape Town and other Southern African locations and issues. This removes the problem of students firstly having to comprehend an *example* before even attempting to understand the *material*. The examples in a first year broad-coverage textbook need to be *familiar* and *incremental* in nature. Examples should begin at a comfortable (but correct) level, then expand to incorporate other aspects, such as problems of size and geographic dispersion. Fundamental concepts should transfer from small scale operations (such as a retail store) into medium (such as a sporting club) and then into larger manufacturing and financial services businesses (such as a bank, or a motor car manufacturer).

6.3. Problem: Lack of Reinforcement

A common student complaint is that the course instructor delivers the course material too quickly. Other complaints include little reinforcement (reminders) of the material and examples are usually *big* business, first world orientated. Many textbooks are tightly edited to remove any repetition. Such removal of repetition causes difficulty for students who do not read the book

sequentially. In our experience, *no student reads a book sequentially*. In fact, even *courses* are not usually presented in the same sequence as the textbook. We recognise this "non-sequential" attribute of our courses and repeat important material in several places. For example, we show the components of a transfer (Source, Destination, Channel and Protocol) in different parts of the book (Erwin and Blewett, 1998, p. 238, 268, 579, 588, 607). Each repetition is in a different situation and encourages students to see the application of fundamental material in different areas, by reinforcing the presence of a major principle or framework.

We saw that students often forgot the meaning of abbreviations. So, throughout the book, we explode abbreviations into their full wording. This means that a student will no longer confuse the Bank for International Settlements (BIS) with Business Information Systems (BIS). We also use acronyms liberally to assist memorisation of key points. For example, a student remembers the seven Critical Computerisation Questions (CCQs) (to assess whether a computerisation investigation should proceed) by using the acronym **CRITICAL**.

A textbook should reinforce other course material as well as *internally* reinforce the book itself. Ideally, the student also has his/her textbook material reinforced by events and institutions in his/her society *outside the class*, as well as within the educational institution. In existing textbooks, this aspect is very well handled for American (and other first world) students by reference to well-known institutions and practices in their society. Such books provide no reinforcement support of that type for our students in Africa. Our textbook refers to local institutions, such as Eskom and Telkom. In addition, our textbook provides "Interactions". Many Interactions require the student to visit different parts of society, such as a bank, soccer club, pharmacy, supermarket and so on. These visits include a questionnaire which helps the student to observe the meaning of words from the textbook *in the real world*.

6.4. Problem: Inappropriate "chunking" and Sequencing of Material

"Chunking" is the choice of which material goes into various chapters, episodes and sections. For example, Capron [1] chunks a chapter on "Database Management Systems". This Chapter first describes what Database Management Systems are, followed by uses for a Database Management System. This sequence of exposure of the material is *product-driven*. A product-driven approach describes the *content of a product*; what it is, and *how* it works. Although product-driven sequence can be useful at a *later, more formal learning stage* for students, it does not properly assist them through the

initial, formative learning stage. Our textbook recognises and caters for *both* stages of learning.

Our textbook has a *problem-driven* approach. A problem-driven approach describes a situation which, as it develops, requires the use of a technology, product, method or design which appropriately services the problem situation. The problem, once recognised, identified and measured, drives the use of the product for solving the problem. A problem-driven approach is also a *requirements-driven* approach. In our textbook, we introduce problems a business faces, such as stock control and payment of suppliers, then, may draw an analogy between existing manual methods and a computerised approach. Database Management Systems are shown to be an appropriate technology (product) for a certain class of problems, rather than a product to be described *per se*. The problem-driven approach is then supported by Structured Material to assist with learning core topics and the required detail for examinations and tests. Our textbook provides the proper chunking and sequencing of material to assist the student when learning concepts, and structured material for later use, such as in examinations. This approach addresses a common question from students, namely, "I know *what* it is and *how* to use it, but *why or when* do I use it?". Later, we discuss briefly how the problem-driven approach drives the design of an Information Systems *course*, not just the textbook material.

Consider another example of the product-driven chunking compared with the problem-driven chunking. Stair [11] includes "Chapter 3: Hardware: Input, Processing and Output Devices". This Chapter covers as a "chunk", the topics of Computer System Components, CPU, Primary and Secondary Storage, such as Tapes and Disks, Classifying Computers, and Input and Output Devices. Chapter 18 of Stair includes a section on "backup procedures" associated with "Information and Technology Management". This chunking and sequence of presentation is the *product-driven* approach, because it describes components and not applications within a business. Our *problem-driven* approach, covering the same material as Chapter 3 of Stair [11], begins with a Story in "Episode C2: Computer Disaster Planning." This Story continues the events in the computerisation of a supermarket, owned and managed by Mr Makhathini, in Africa. As a result of a disaster which destroys Mr Makhathini's computer, the issue of backup procedures, and copies of data and software arises. Discussion of methods of backup follows, and then a description of magnetic tape principles occurs in the context of a problem to be solved. Now, in this Story, and because of the business problem, for the student, the calculation of the capacity of a magnetic tape becomes important and relevant, not just an exercise in arithmetic. Our textbook has *no single section* which describes hardware and computer components. The relevant descriptions occur in

contexts in which such component descriptions are relevant and needed. A student learns about components and products at the time the information is needed. Descriptions also occur at several different levels of detail. There is a first level description, for assimilating the overall concept. Then, there is a more detailed description in a separate sub-section. This style recognises that a student needs to be comfortable at an overall level first, then, as problems arise the more detailed description is more comfortable and meaningful.

Our chunking arrangement and sequencing mean that students do not regard concepts as strictly compartmentalised. Concepts are introduced in an appropriate problem situation and often reappear in later Episodes. For example, the topics covered in Stair [11], Chapter 3: Hardware: Input, Processing and Output Devices) need approx. 30 pages. Erwin and Blewett [3], covers the same material as Stair [11] Chapter 3 in over 100 pages, namely, Storage Devices, pp. 105-112; Principles of Disk Operation, pp. 211-228; Data Representation and the Machine Cycle, pp. 245-298; Input Devices, pp. 355-364; Output Devices, pp. 473-484, and Magnetic Tape Principles, pp. 563-574. The Stair chunking suits the purpose of arranging like-items together. The Erwin and Blewett chunking arranges material as a flowing, natural story, then, as problems and situations arise which need computer approaches, the textbook describes and explains the material to apply that technology. This chunking means that the introduction of hardware is part of problem solutions. For example, students learn about Output Devices in the context of Office Automation and Word Processing. They learn about Magnetic Tape Principles in the context of disaster and backup issues.

There is so much material available in the IS field that a student can become confused about his/her position within the material. To reduce this problem, we introduced a *uniform framework for every Episode* in the textbook. No other textbook known to us (in this field) has such a uniform framework in every Chapter / Episode. All other textbooks known to us in this field present each Chapter in a separate framework, or arrangement. Each Chapter's material is arranged in its own special way. Course instructors have no difficulty adjusting to different styles of presentation in each Chapter. Novice students struggle with such a scheme.

Every **Episode** in our textbook has the following format / framework:

Story ♦ **Transition** ♦ **Structured Material** ♦ **Infobyte**

Every **Story** unfolds in the STAIR framework, namely:

- **Stimulus:** events or circumstances which lead to discussion of a business problem

- **Trouble:** exploration and identification of business problem(s) as a result of the Stimulus
- **Approach:** discussion of various approaches for resolving the identified business problem(s)
- **Implementation:** actions to install the chosen Approach
- **Review:** a look back at the Implementation and its success/failure.

The **Transition** after each Story is a summary of the Business Computing principles and events in the Story, and an anticipation of the formal treatment of material to follow in the Structured Material.

The Structured Material follows the Transition. **Structured Material** is in the **KAIR** format, namely:

Knowledge: facts and techniques

Awareness: importance, role, potential and widespread usage

Interaction: practical exercises, direct touch, visits to the real-world

Reality: business implementation issues.

The **KAIR** elements make up the four parts of **Computer Literacy and Competency**.

To further provide the student/reader with a ‘road map’ through the material in the book, the **Knowledge** part of **KAIR** in Structured Material is split into **COURSE** elements, namely:

Complaint: opportunities and/or difficulties which lead to a business investigating a specific topic

Overview: the mainstream content of the topic

Usage: how to use this technology

Resources: resources associated with the use of this technology

Strategy: options and approaches

Examples: illustrations of the use of this technology in various levels of business

After each Structured Material section is an **Infobyte**. An Infobyte provides background, and further detail on Business Computing topics. We aim Infobytes at students requiring more than a first-level understanding of a Business Computing topic. Typically, this will be an

Information Systems major student, an Information Systems support person and, of course, an Information Systems developer. For example, Infobyte I3 appears at the end of Episode A3 and covers Data Representation in a Computer and the Machine Cycle.

The uniform framework in every Episode means that a student *can learn about various topics in a standard way*, and begin to see the common aspects of topics such as Database and Spreadsheets. To further assist the student, we also devised a **framework for learning about the usage of various packages**, components, and so on. This is the **SKRAP** framework, namely:

- **Setup:** actions to establish initial use of a package; data and data definitions.
- **Keep:** actions to preserve /save / keep work / data / software established in the application.
- **Retrieve:** actions to retrieve / find / call back for use, the data / definitions in an application.
- **Alter:** actions to alter / amend / change data and definitions in the application.
- **Print:** actions to list / inspect / print / display / query data and definitions in the application.

This SKRAP framework considerably assists students when approaching a new software package or application. *The SKRAP actions have to be supplied by every package / application.* No application can exist without providing the SKRAP actions. The student can now search for a way to perform each SKRAP action, and, when (s)he has conquered SKRAP, (s)he will be able to move on to more complex variations of those basic actions. Initial comfortable usage comes from pursuing SKRAP.

The book has three major **Levels** arranged in Sections: A, B and C.

- **Level A** contains **Fundamentals:** computers, hardware, software, internal computer principles, business requirements, computer selection, and so on. Some detailed Fundamental material appears elsewhere. For example, Magnetic Tape Principles appear in Infobyte I8 at the end of Episode C2 in Level C.
- **Level B** covers major **Applications** areas; *Database, Spreadsheet (DSS) and Office Automation.*
- **Level C** covers **Implications** of using computerised Information Systems, such as backup, disaster recovery planning, networks, security, Information Systems Development (ISD), package software, and so on.

In conjunction with Infobytes, a course instructor or a novice reader can choose a selection of material to suit various depths and lengths of courses of study. The repetition of some material at different Levels and within Levels assists such a customised choice.

6.5. Problem: Inappropriate Use of Language

Every subject has its own jargon and specific terminology. Any course in the subject includes the acquisition of this terminology. However, when a textbook uses difficult, hard-to-read language a student has understanding problems. Many textbooks use *passive voice* to expose material. Passive voice is an attribute of “verbs in sentences in which the grammatical subject is the recipient of the action described by the verb” [5], as in ‘Total revenue from selling soccer tickets is calculated by the computer application.’. *Active voice* is an attribute of

“verbs used to indicate that the subject of a sentence is performing the action or causing the event or process” [5], as in ‘The computer application calculates total revenue from selling soccer tickets.’ Our textbook almost exclusively uses *active* voice, because active voice presents concepts in a more ‘natural’ way and contributes to the easy-to-read, soft language, attribute of a textbook. This style can sometimes appear to make the content elementary, because the wording is so simple. However, our treatment of material is usually deeper than most American and British textbooks.

Material in existing textbooks is often dense and boring with long passages of unrelieved text. Many students find that a textbook presents material in a particular way, and then moves on to the next topic. Our experience is that many students understand material better when we present it to them *in several different ways*. That seems to be one of the main objectives of lectures. However, in our textbook, we introduced a unique concept, known as the *Wise Guru*. This ‘person’ is a device to break the text into smaller sections by looking back on material and describing its contents *in a different writing style, different font, and with different words*. The *Wise Guru* also points out important material and common topics for examination questions to students.

Because we live and teach in Africa, we were concerned to produce an African-flavoured textbook which recognised both our strengths and weaknesses. We wanted to present the student with a ‘comfortable, but correct’ introduction to fundamental concepts. To do this we divided the book into Episodes, rather than Chapters, and wrote a series of Stories. Every Episode begins with a Story. We wrote the stories in conversational, novel-style English. Read as a whole throughout the book, the Stories cover the first year of computerisation for Mr Makhathini’s supermarket business. The Story format, and language, enable us to lead the student into important issues in an interesting way. The Stories contain drama, action, discussion, human difficulties and humour. These Stories allow comfortable assimilation of concepts at *initial* learning stage and are excellent pre-reading for lectures, tutorials and discussion groups. Plans are underway to offer these Stories, and the Structured Material, as a series of video Episodes for presentation to classes, on educational TV, and so on. This medium can assist course instructors with presentation of material.

6.6. Problem: The Placement of Appendices

Information Systems textbooks often contain Appendices at the end of the book with detailed, off-the-mainstream topics. Our experience is that students often regard such Appendices as unimportant. In our textbook, we introduced the concept of an **Infobyte**. An Infobyte is a section at the end of each Episode which contains the next level of detail after the material in the main part of

the Episode. For example, in Episode C2: Disaster Planning, Infobyte 18 contains two Nybbles. The first Nybble is about Backup Principles, and, the second Nybble is about Magnetic Tape Principles. The Infobyte approach keeps detail out of the mainstream topics of the book, and places the detailed material adjacent to its (commonly-applied) area of application.

6.7. Problem: Unrealistic element

Much of the material presented in existing texts conveys the idea to students that computerisation is an almost magic process which can improve any given situation with little effort or mistake.

Existing textbooks describe *smooth success* for computer implementations following ideal sequences of activities. Real world experience is different, and our textbook recognises this. Our book discusses plans, options and issues, and recognises that, in reality, not all will go as planned. Important messages in the book are "It's not easy to computerise", and "Not everyone is keen about computerisation". But, it is manageable and achievable. The novice Mr Makhathini has some computerisation problems, such as staff resistance, and in discussion in our book, various approaches are covered. Mr Makhathini fails at some of his attempts, but the student learns from such setbacks.

We retain a realistic treatment of computers and computerisation throughout our entire book. Our characters raise real life issues, both as people going through the computerisation process, and from the *Wise Guru*. The *Wise Guru* is a character (outside Mr Makhathini's family and business) who talks directly to the student reader of our book. The *Wise Guru* helps the student reader, by offering advice, and comments on issues as Mr Makhathini makes decisions or mistakes. The *Wise Guru* advises about important issues such as examiners' approaches to topics. The *Wise Guru* has empathy for the student in the learning situation. Students reading our book will not feel that they are a third party reading dry facts presented to them by some well-learned authors. Rather, through the use of Mr Makhathini's relatives, staff and friends, and other aids such as the *Wise Guru*, the students reading our book should relate to the development and learning experiences of Mr Makhathini.

7. Content of our Textbook

There is no new information in our book. The level of our material is first level, novice level; assuming no previous contact with computers, or business. Our *frameworks and approach* are new in order to address the problems discussed above. The textbook contains a full syllabus to support a one year, or shorter, Information Systems course.

8. Implementation of problem-driven approach at University of Durban-Westville (UDW)

The textbook (Erwin and Blewett) is prescribed for approx. 900 Information Systems I (IS1) students in the Faculty of Commerce and Administration (Department of Information Systems & Technology) at the University of Durban-Westville (UDW) in 1998, as well as at more than a dozen other tertiary institutions throughout Southern Africa. Previously, Stair [11] was prescribed at UDW, except in 1995 when *no textbook* was prescribed. Stair had become so inappropriate that a decision was taken to issue notes, rather than use a foreign textbook. Some of the material from our textbook was used in IS1 in 1995 as test exposure. IS1 is a first-year course covering two semesters. Almost all IS1 students are registered for a B. Com. (Bachelor of Commerce) or B. Acc. (Bachelor of Accountancy), or a B. Admin. (Bachelor of Administration) Degree, with the rest being B.Sc. (Bachelor of Science) students. IS1 (wholly or partially) will eventually form a *service course* for most UDW students.

Adopting a problem-driven textbook means that large parts of formerly product-driven material had to be adjusted. At UDW, IS1 was reorganised in 1996 to match the problem-driven nature of the textbook with a problem-driven approach to the whole course. Using a product-driven textbook in a problem-driven course is awkward. And vice-versa. It is not a successful strategy to change the textbook to be problem-driven, and then continue to lecture and organise the rest of the course in a product-driven way.

Here are some of the aspects of IS1/UDW course delivery which supported the problem-driven textbook:

1. Before lectures commenced students had to register on a workstation in the IS Information Centre (IC) with their own personal details, and some other data re courses taken, and so on. This forced (most) students to view and use the IC. (IS does not have a Lab! Labs are where chemicals mix to form explosions. IS has an Information Centre, with the traditional workstations, printers, cables, magazines, and so on.) The students' personal data was then used, by the students, as a base for appending more data, and then as a means of discussing data, information, integrity of data, and so on. Students had access to overall class data as well as their own individual data. Students saw the problems of integrity, confidentiality, and so on, *before* they realised they had seen a database system or the software for database, or had any lectures on database systems. Real-life problems showed them the issues. The lectures and textbook helped students to make sense of their experience. Students were encouraged to use the SKRAP framework described above.

2. All student work has to be submitted in a personal "bin" on the IS LAN (Novell). Handwriting is not normally accepted. As part of the problem-driven approach, IS students must use the technology that they are being taught.
3. No *tutorials* were held, partly due to lack of staff. In lieu of tutorials, IS students attend Personal Development Programs (PDPs) where the practical work and issues from lectures are discussed in groups of about 20, supervised by an academic. "Tutorial" is a poor term to describe the process of "comfort-generation" that we sought early in the course, so we sought a new term. The use of words to describe course items is critical to the formation of student perceptions about the course. PDPs were optional.
4. "Interaction"s from the textbook were used to send students out to the real-world.
5. Students also had practical work in the IS IC (Information Centre). To begin with this work used the students' personal data from each individual in the class. Issues of confidentiality, accuracy, integrity, lies, errors in software/network, non-cooperation and so on, soon arose for discussion at PDPs and in lectures. Novice students find it difficult to relate to business organisation and control issues. Dealing with their own data, seeing the problems there, and moving on to more general approaches and concept-learning, was a comfortable starting approach. Our approach is to offer "Work Performance Improvement Courses", rather than "Computer Courses".
6. The style of test and examination questions altered. Students were coached in the meaning of "Describe" and "Discuss", amid fierce resistance from many who wanted the IS1 course to be run according to their perception of a "computer course", namely, questions on keyboard activities. Tests and examinations do not examine keyboard activities. IS1 test and examination questions tend to begin with a scenario, such as "You are the owner of a supermarket, and Outline the steps you would take to implement a stock control system, including the use of a computer. Justify your steps at every stage." Or, "During your IS1 course, you were asked to visit a bank, or a car manufacturer, or a building society, or ..., and report back on their use of spreadsheets (or networks, or ...). Describe your visit, in the context of the spreadsheet (network, ...) usage you found, and discuss what you found using material from your IS1 course. Extra marks are awarded for a systematic answer." Students *do not like* these types of questions, but, we believe that this aspect of the problem-driven approach is an excellent way to build up confidence and competence, and to prepare students for the workplace. IT issues are always related to, in fact, flow from, problems.
7. No multiple-choice tests or examination material were used. We believe such material is more a language and

semantics exercise rather than a test of knowledge or understanding. Such material encourages piecemeal learning, and remembered phrases, at the cost of students' inability to describe or discuss an issue/problem.

8. All practical work and Interactions were compulsory activities.

Survey of IS1 Students at University of Durban-Westville (UDW)

The survey was conducted during a scheduled IS1 lecture period in a lecture hall. 131 respondents completed the "Questionnaire" form.

A special section of the Questionnaire form referred to the textbook. Other aspects of the course were also covered, but, only results from the textbook section are reported here. Not all respondents replied to all items on the questionnaire. Each respondent assigned a RATING to attributes of the textbook on a scale of 0 to 10, where:

- 0: TOTALLY UNSATISFACTORY
- 5: SATISFACTORY

10: EXCELLENT

Table 1 below, shows the results of the textbook survey. The *first column* in Table 1 shows the "Attribute" rated. For example, "Easy-to-read". The *second column* shows the *Total Number of Ratings (Respondents)* for that attribute. The *third column*, headed "<5", shows the *percentage* of Ratings less than 5. In other words, the % of respondents for this attribute who rated the attribute as "less than satisfactory". The *fourth column*, headed ">=5", shows the *percentage* of Ratings greater than or equal to 5. In other words, the % of respondents for this attribute who rated the attribute as "satisfactory or better". The *fifth column*, headed ">=7", shows the *percentage* of Ratings greater than or equal to 7. In other words, the % of respondents for this attribute who rated the attribute as "very good or better". The *sixth column*, headed ">=9", shows the *percentage* of Ratings greater than or equal to 9. In other words, the % of respondents for this attribute who rated the attribute as "almost excellent or excellent". Responses are not shown for all Attributes questioned.

Table 1: UDW Survey Results for Erwin and Blewett [3]

Attribute	Total Number of Ratings (Respondents)	<5 % “less than satisfactory”	>=5 % “satisfactory or better”	>=7 % “very good or better”	>=9 % “almost excellent or excellent”
Informative	128	12	88	62	41
Easy-to-read	128	8	92	74	47
The “Story” at the start of each Episode	128	20	80	61	38
The style of language used	126	11	89	67	44
Examples used in the textbook	126	8	92	60	40
Level of Material (0 if elementary level, 10 if much too complex)	113	18	82	22	7
OVERALL RATING FOR THE TEXTBOOK	122	9	91	57	27

Except for the Attribute “Level of Material (0 if elementary level, 10 if much too complex)”, the higher the Rating (the closer to 10) the better the acceptance of and reaction to the textbook by the respondents. Overall acceptance level for the textbook was very high. 91% of respondents for “OVERALL RATING FOR THE TEXTBOOK” rated it as “satisfactory or better”, and 57% as “very good or better”. Further analysis of these results appears in [4].

A textbook is one medium, amongst many, which can contribute to course success/failure. Examination results, and students’ level of understanding and knowledge, can be other indicators of course improvement compared with previous material and methods. For the authors, the results are pleasing, although preliminary. There was no indication of significant rejection of any feature of the textbook, or the textbook as a whole. Several other aspects of the course received poor RATINGS, showing that respondents did not seem to rate all questionnaire items highly regardless of the item.

9. Conclusions

The problem-driven approach appears to be a satisfactory approach for a first-year Information Systems course, as well as suited for education of business people.

A textbook is not the only medium of teaching in a course. Tutorials, lectures, PDPs, assignments, practicals, and so on, all make a contribution. But, for many students, the textbook sets the tone and level of the

course, and becomes a safe source of useful knowledge. The approach used in our textbook is expected to be appropriate for many types of student audience even in a developed country.

Course instructors need to revisit course objectives, course methods and course perspective to determine an appropriate conceptual model for teaching. Driven by changing student population, changing employer requirements and changing society, there is a need to reevaluate existing paradigms. Courses should be designed in the best possible way, and then, the best possible textbook, and other material, used to support the course. We believe that the problem-driven conceptual model is the appropriate one for the South African future in Information Systems education. Moulder says we have to “ride the wave” that is rolling over South African society, and education in particular [7]. Otherwise, we will drown!

The disadvantaged nature of pre-University education in South Africa means that a University student needs much personal mentoring. However, the massive increase in the number of African students and the corresponding decrease in the subsidy from national Government has meant a drastic worsening in the student/staff ratios and computer equipment/student ratios at Universities. There is a huge requirement to expose South African students to Information Systems & Technology, but little money to facilitate this. The provision of a South African textbook is only one step in the battle to provide meaningful,

modern education for most of South Africa's previously disadvantaged people.

Notes

(Erwin and Blewett, 1998) is available via the electronic bookstore amazon.com or from the publisher, Juta & Co. Ltd., Cape Town, South Africa www.juta.co.za.

Overhead Projector slides are available in Microsoft Powerpoint format, with samples via Internet from <http://is.udw.ac.za> for prescribers. Course instructors can select individual slides for printing on Transparencies, or retain the electronic slides for display within a classroom with a notebook/laptop computer. The course instructor can customise the overhead slide material, and other, to suit a local course.

References

- [1] Capron H. (1990), *Computers - Tools for an Information Age*, Second Edition, The Benjamin/Cummings Publishing Company, Inc., Redwood City, California.
- [2] Crossman, T. D., Fortmann, P., Heneke, V. and Murray, D., 1995. 'Information Technology in a Developing Economy'. In *South African Computer Journal*, No. 15, pp.13-19.
- [3] Erwin G.J. and Blewett C.N. (1998), *Business Computing: An African Perspective*, Juta & Co Ltd., Cape Town, South Africa. ISBN 0 7021 3340 X, approx. 700 pages. First printing 1996.

University of Natal, Durban, South Africa, 26-27 September, 1996, pp. 195-210.

[5] Hanks P. (Ed.) (1988), *The Collins Concise Dictionary of the English Language*, 2nd. Edition, Collins, London.

[6] Long L. and Long N. (1990), *Computers*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, p. 60.

[7] Moulder J. (1994), Riding the Wave, in *FOCUS*, Transformation Section, University of Natal, Durban, South Africa, Winter 1994, pp. 21-22.

[8] O'Brien J. A. (1988), *Information Systems in Business Management*, Fifth Edition, Richard D. Irwin, Inc., Homewood, Illinois.

[9] O'Leary T.J. and Williams B.K. (1985), *Computers and Information Processing*, Benjamin/Cummings Publishing Company, Inc., Menlo Park, California.

[10] Pfleeger C.P. (1989), *Security in Computers*, Prentice-Hall Inc., International Edition, New Jersey.

[11] Stair R.M. (1992), *Principles of Information Systems: A Managerial Approach*, boyd and fraser publishing company, Boston, MA.

[4] Erwin G.J. and Blewett C.N. (1996). The Design and Usage of a new Southern African Information Systems Textbook, in *Proceedings of SAICSIT 96: The 1996 National Research and Development Conference*,