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Edited by U Aickelin

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Systems Thinking: Creative Holism for Managers

MC Jackson

John Wiley & Sons, 2003. 376pp. £35.00

ISBN: 0470845228

In his preface to *Systems Thinking: Creative Holism for Managers*,¹ published in November 2003 by Wiley, MC Jackson mentions that an inspiration for his work was the success of an earlier work by Flood and himself, the well known *Creative Problem Solving: Total Systems Intervention*.² The latter served as a very popular vehicle to introduce managers to the new developments of systems thinking spanning beyond the functionalist and interpretive paradigm and to summarize the state of the art in this field as of 1991. The book under review here in my opinion exceeds the qualities that made the 1991 volume successful for its excellent summary of the latest research findings and for its very clear explanations and accessibility.

The book starts with a concise discussion of several reference disciplines to systems thinking including philosophy, biology, control engineering, organization and management theory and the physical sciences. The book uses still the ideas of the Systems of Systems Methodology (SOSM), an ideal type of grid of problem contexts, suggested originally by Jackson and Keys in 1984. However, probably to avoid some previous criticism, Jackson carefully stresses in chapter two, that the linking of systems approaches to problem contexts using SOSM is only indicative of the assumptions made by different systems approaches about the nature of problem contexts without the intention to pigeon-hole methodologies. My opinion is that this unpretentious formulation facilitates the presentation of the different systems approaches without raising the need to argue about

the merits of SOSM, recognizing also that its interpretation has evolved over the years since 1984.

Metaphors still play an important role in the creative interpretation of organizations as in the 1991 book mentioned earlier,² but Jackson has accepted the additions to metaphor analysis by Flood,³ for example, brainstorming. This time, the author has grouped in his analysis the known systems approaches using the recent contribution to the classification of paradigms by Alvesson and Deetz,⁴ which allows the direct incorporation of postmodern systems thinking. That was something usually left aside as an additional item when applying the traditional classification by Burrell and Morgan.⁵ Thus, Jackson has substantially updated the starting points of the argument in the 1991 book on *Creative Problem Solving* in a way that reflects the evolution of research results over that last decade.

Part two of the book is the one that is of greatest value to practising managers and to postgraduate students wishing to learn about the foundations and the applicability of different systems approaches today. It is very informative for the reader as the description of every approach is showing its historical development, philosophical and theoretical foundations, methodology and methods that are part of it and a summary of recent developments. That is followed by an illustration of how it is applied in action, by a review of the criticism of the approach, and by a discussion on the value of the approach to managers. No other recent book in the systems field aims for such an accessible and at the same time rigorous interpretation of the major developments of systems theory.

Refreshing topics in the book include chapters on complexity theory and team syntegrity, usually not covered in other summary publications on systems thinking, which is another support for the conclusion that this volume is representative of the current state of the art in the systems field. At the same time, it is understandable that due to the

introductory nature of the volume and possibly the size restrictions that follow from that, it cannot cover all possible systems approaches, including autopoiesis, Warfield's Interactive Management and Churchman's Social Systems Design. These however are discussed in the more theoretical recent book by Jackson,⁶ oriented towards the research community.

The major new theoretical ideas of the book under review are in the last part, called Creative Holism. According to the author, it is concerned with how to maximize the benefit of the different holistic approaches by using them creatively in combination. This book is a culmination of the evolution of the author's ideas on Critical Systems Practice (CSP), developing since 1997. It is the first comprehensive attempt to lay out the full picture of its theoretical foundations and how it can be applied. Jackson provides a very good justification for the treatment of methods not as parts of the existing methodologies but rather as parts of four generic systems methodologies: functionalist, interpretive, emancipatory and postmodern. He presents a new formulation on the process of Critical Systems Practice that is an extension of earlier ideas on Total Systems Intervention (TSI), apparently developed in response to certain criticisms of TSI (see Flood and Jackson's book² for the first version of TSI³).

The current state of pluralism in Systems Thinking has several competing interpretations on issues such as the philosophical foundations for pluralism, treatment of paradigm incommensurability and whether pluralism is a paradigm on its own. Jackson's book clearly states his viewpoint on the above issues with respect to Critical Systems Practice but is not very detailed on direct evaluations along those lines of other suggested pluralist approaches. It is too early to compare Critical Systems Practice with Multimethodology,⁷ Midgley's ideas on pluralism in the process of systemic intervention⁸ or PANDA⁹ as methodologies advocating using parts of different methodologies from different paradigms in the same problem situation. Only practice may show the advantages of particular methodologies from the above list and hence this question is beyond the purpose of this review. However, the comprehensive presentation on CSP by Jackson in his latest book is a significant theoretical contribution even if it is viewed only as a factor opening the possibilities for such comparative studies by researchers and practitioners.

The layout of the content of the book is logical, streamlined and uniform. That makes the book understandable not only by practitioners but also by novices to the systems field such as students entering various masters or doctoral programs in Management and Systems Thinking. Judging from the fact that the number of significant systems books in the world, published since 1997 is less than five and none of them were introductory, such readers seem to be in a desperate need for a contemporary overview text. There is

no other book on the market that successfully presents the diverse and rich ideas in systems approaches belonging to the various known paradigms with such an attention to rigor, relevance and accessibility.

In conclusion, the experiences with this book support strongly my opinion that Systems Thinking: Creative Holism for Managers by Mike Jackson is a very important contribution to the management and systems literature for its excellent blend of rigor and relevance in presenting the contemporary status of ideas in the systems field, for its value as a teaching resource for postgraduate students and for practicing managers as well and for its summary of the latest research work in systems thinking.

References

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- 6 Jackson MC (2000). *Systems Approaches to Management*. Kluwer/Plenum Publishers: New York, Boston.
- 7 Mingers J (1997). Multi-paradigm multimethodology. In: Mingers J and Gill A (eds). *Multimethodology: the Theory and Practice of Integrating OR and Systems Methodologies*. Wiley, Chichester, pp 1–22.
- 8 Midgley G (2000). *Systemic Intervention: Philosophy, Methodology and Practice*. Kluwer/Plenum Publishers: New York, Boston.
- 9 Taket A and White L (2000). *Partnership and Participation. Decision Making in the Multiagency Setting*. Wiley: Chichester.

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Business Models: A Strategic Management Approach

A Afuah

McGraw-Hill, 2003. 448pp. £50.00

ISBN: 0072883642

Those who use software such as spreadsheets and simulation packages to build models in a business context will have noticed the term 'business model' edging into common usage and may have been intrigued by this. This more recent use of the phrase indicates something different than the output of a business modelling activity that many members of the OR Society might be familiar with. Wikipedia adopts this more recent perspective when it states 'a business model (also

called a business design) is the mechanism by which a business intends to generate revenue and profits. It is a summary of how a company plans to serve its customers.' This definition seems to be consistent with that used by the author of this book, Dr Afuah at Michigan University, namely that a business model is 'a framework for making money. It is the set of activities which a firm performs, how it performs them, and when it performs them so as to offer its customer benefits they want and to earn a profit' (Afuah, 2004, p. 2).

The upsurge in the Internet has also propelled the use of the phrase business model. However, unfortunately, a by-product is that some believe that business models only exist in the context of the Internet. A book such as this will hopefully dispel that illusion. Therefore, it is refreshing to see a book that attempts to explain the meaning of business models in this new sense of the phrase and covers how such models can be developed and used. The book's sub-title and the introduction emphasize that the approach is very much drawn from the Strategic Management domain and the book appears well-anchored in this context. However, I must admit that despite the author tackling the question 'what the differences are between a business model and strategy' (p. 11) I was left unsure of the difference and wasn't clear overall if this was simply a strategic management textbook presented in a slightly different way rather than a book about business models.

The book is divided into two parts; the first containing 13 chapters that outline theory and the second comprising 10 cases. Chapter 1 introduces and provides an overview while chapter 2 covers customer value and relative positioning. Chapters 3 and 4 focus on revenue with pricing to optimize revenues as the topic of the earlier chapter and sources of revenues and market targets as the latter. Chapter 5 deals with the value adding activities required for a profitable business model. Resources and capabilities are explored as the roots of a business model in chapter 6 while the next chapter looks at implementing the designed business model. Chapter 8 considers key issues to do with sustaining competitive advantage and profitability; particularly how to profit from change by innovating. The theme of chapter 9 concerns how to analyse costs associated with business models while chapter 10 addresses the analysis of the business model for sources of profitability and competitive advantage. Chapter 11 covers how to finance and value a business model. Instituting a process to plan and implement business models on an ongoing basis is the subject of chapter 12, while the final chapter deals with corporate social responsibility and governance. Each chapter starts with an introduction and ends with a summary, study questions and endnotes. The arrangement of the latter I found annoying with its reliance on references contained within the endnotes at the end of each chapter—I would have preferred to see a full list of references at the end of the book.

Part two contains 10 case studies, each from 12 to 17 pages in length. The publicity 'blurb' refers to the author's interest in disruptive technological change and sheds light on the inclusion of case studies such as those on Viagra, Segway and eBay; cases 1, 5 and 9, respectively. The case topics reflect the author's previous books on innovation¹ and Internet business models.² The book concludes with a 15 page, double-column, name and subject index.

Tutors teaching courses on business models in areas such as Strategic Management or Entrepreneurship for Masters, or advanced level undergraduates, are highlighted as the main target for the text. I suspect that for the student audience the author has done a good job of putting together a readable text containing up to date material, albeit with some caveats that I now state. Given the author's location it is to be expected that the text reflects North American thinking. For example, the definition of business model, and business itself, restricts the discussion to 'for profit' organizations, a somewhat more restrictive stance than a European author might take. I am not sure how useful the case studies could be in a teaching situation given that no advice is provided on how to use them nor any suitable questions indicated to stimulate discussion. Similarly, no information is given on whether support materials will be available for adopters. Finally, the purchase price seems to be set high, this may be to reflect the novelty value of the text, but this could obstruct its take up.

It may be that author's claim in the preface that this is the first text dedicated to business models is correct—this of course means that he is discounting his own earlier contribution on Internet Business Models.² I believe that he has generated a useful contribution to the literature on this topic. However, I suspect the definitive book on the subject of business models is yet to be written.

References

- 1 Afuah A (2003). *Innovation Management: Strategies, Implementation and Profits*. Oxford University Press: Oxford.
- 2 Afuah A and Tucci C (2002). *Internet Business Models and Strategies: Text and Cases*. McGraw-Hill Education: New York.

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A First Systems Book: Technology and Management

M Myers and A Kaposi

World Scientific, 2004. 224pp. £21.00

ISBN: 1860944329

A First Systems Book, Technology and Management, is an introduction to the systems approach for modelling and

solving real-world problems. The book presents a brief but solid description of the P/p (product/process) methodology for systems analysis. Overall, the material in this book is well presented and this helps the reader to keep engaged. The authors introduce concepts and methods of systems analysis using a variety of examples for illustration in most of the chapters.

Chapter 1 presents a good introduction and sets the context and arguments for the need of a systems approach to solve problems in any discipline. In this introduction, readers get an overview of the P/p methodology, which is the main topic of the whole book. Chapter 2 not only describes the fundamental concepts in the systems approach, but it also discusses and illustrates each concept in an effective manner. Moreover, the inter-relationships between the various concepts are also well presented.

The subject of chapter 3 is the modelling of systems. In this chapter, the section on means of communication is rather confusing. This is perhaps because there is a change in the style in which the information is communicated in this chapter. For example, the language used to express ideas is different from the one used in chapters 1 and 2, which makes the reading somehow less interesting. It is also not clear why some of the concepts introduced in chapter 3 (eg kinds of representations) were not given in chapter 2 instead. The section on models makes a very effective connection between concepts such as referents, attributes, and measures and the construction of representations.

Chapter 4 gives a more detailed description of black box systems and structural systems, but more examples should have been used to better illustrate the differences between these two types of systems. Other concepts that are well described but should have been illustrated better are: specification, validation, verification, and constructivity. A very good presentation on scales types (eg nominal, ordinal, interval, ratio, and absolute) for measurements is given in chapter 5 which also includes a good variety of examples. However, the discussion on the hierarchy and type of measures (direct, indirect, object-centered, and utility) should be more detailed. This chapter is very important because the right selection of the adequate scale to measure the attributes of referents is crucial in systems theory.

The subject of chapter 6 is the modelling of black box systems and it is well presented. Compared with other chapters in the book, chapter 6 is too brief in describing such an important part of the P/p methodology. Some aspects that could be improved in chapter 6 are for example: (1) more illustrative examples for the referential cohesion and the temporal cohesion required in the relation set of a model, and (2) more detailed discussion on the relation between the measurement hierarchy and black box systems. Structural systems are briefly but clearly described in chapter 7. The focus of chapter 8 is on systems being modelled as products while chapter 9 focuses on systems being modelled as processes. These two chapters are well presented overall and

both provide a good range of examples for illustrating the concepts described. Finally, chapter 10 describes in good detail a number of study cases (some fictitious and some real) in which the P/p methodology has been applied to model and analyse systems.

In summary, the reviewer believes that this book is a very good option to be used as a text book or supporting material for an undergraduate course on the systems approach for problem modelling and solving. The book gives an adequate and nice introduction to systems theory, but readers seeking a more in depth presentation into this topic, should look elsewhere. As such, this book should be recommended for students and perhaps practitioners with no prior knowledge of the systems approach.

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Systems Modelling: Theory and Practice

M Pidd (ed.)

John Wiley & Sons, 2004. 236pp. £25.00
ISBN: 0470867310

Black and white; red and violet; soft and hard: all stark opposites to our ears. Yet between each is a wealth of possibilities. Black and white are separated by countless shades of grey; there is a whole spectrum of colour between red and violet; and there is no simple dichotomy between soft and hard, particularly when they are applied adjectivally to activities such as modelling. The OR literature abounds with discussions of soft and hard modelling, soft and hard systems, and so on. Initially, in the 1970s and 1980s they were contrasted, with some proponents of soft techniques, a term which they introduced for qualitative modelling, seeming to suggest that for complex socio-technological problems hard operational research models, by which they meant quantitative models, had little role to play. Only for commonly occurring problems in production, logistics, scheduling, etc. would hard techniques such as linear programming, combinations and general optimization be needed; ill-structured, one-off, complex problems required the more holistic soft approaches. Then the boundaries softened, marked perhaps by a seminal meeting organized by our society and the subsequent publication the first edition of Rosenhead's *Rational Analysis for a Problematic World*.¹ First, divisions between the different camps of soft modelling—soft systems, cognitive maps, robustness analysis and so on—mellowed. More importantly, there was a growing recognition that any approach to problem solving involved both qualitative and quantitative techniques. Soft methods provided the means to formulate issues and to explore those aspects which remained at the edge of our understanding.

Better defined aspects could be modelled and explored quantitatively using traditional operational research techniques. All the analyses, however quantitative or qualitative they might be, would contribute to our understanding and through that understanding we could address and resolve the problems. When I received this book edited by Mike Pidd for review, I thought that finally the hard-soft rift had been healed. Here was a book that promised to merge perspectives on hard and soft modelling 'creating a complementary approach that requires more than common sense and results in significant organisational benefits'. The first chapter is entitled Complementarity in Systems Modelling and the word 'complementarity' occurs in four of the other 11 chapters. Sadly on reading the book my hopes were somewhat dashed. While there are a multitude of insightful diagrams taking valuable perspectives on a host of issues, there is hardly a single quantitative model. Section 7.4.5, An Algebraic Model, is perhaps the most quantitative in the book, but contains only four symbols and a set of difference equations sketched in ill-defined computer pseudo-code. Other than that no quantitative hard analysis is illustrated. While this book talks of the complementarity of hard and soft methods, it focuses entirely on the soft.

That said, my criticism is over. This is an excellent book: it just happens to be a book on soft methods alone. Pidd has assembled an impressive list of contributors: Fran Ackerman, Joyce Brown, Peter Checkland, Ceri Cooper, Colin Eden, Roger Forder, Sue Holwell, Ruth Kowlaczyk, Michael Lyons, John Morecroft, George Paterson, George Pickburn, Michael Pidd himself, Sean Price and Alan Robinson. All have been working in the Interdisciplinary Research Network on Complementarity in Systems Modelling funded by the UK's Engineering and Physical Sciences Research Council. Together they provide an outstanding, concise, easily read overview of the state of the art in soft OR and soft systems. Read two books, this and the second edition of Rosenhead's book² published a few years back; and you will have a near complete picture of soft methodologies. Moreover, this book is a work in progress; the research network is still running. We can only hope that by the time it completes Pidd will have reassembled his authors and produced a work that truly reflects the complementarity of both hard and soft approaches and the interplay between them. Until then, read this book and enjoy it as much as I did.

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Knapsack Problems

H Kellerer, U Pferschy and D Pisinger

Springer-Verlag, 2004. 566pp. £77.00
ISBN: 3540402861

The knapsack problem is one of the most widely studied problems in combinatorial optimization. Ever since the first book on knapsack problems, by Martello and Toth,¹ appeared in 1990, there has been a great deal of work on the extensions and variations of the standard knapsack problem—evidence of just how fascinating this problem is. Substantial as these research corpora are, it is nowadays very difficult to keep track of the available results of this topic. This timely publication integrates the relevant but unkempt bodies of knowledge into one book. It presents the state of the art and shows how much the area has advanced since the original book was published.

The book explores the knapsack problem and its variants in 15 chapters, which are organized in increasing order of structural difficulty. The first few chapters are very straightforward, easy to read, and cover topics that are typical in most algorithms and optimization books. This makes the book very readable and suitable for students of computer science, mathematics, and operational research. Apart from the standard knapsack problem, the authors elaborate the solution techniques for the subset sum problem, the bound and unbounded knapsack problem, the multidimensional (a knapsack problem with d constraints), multiple (m knapsacks are available for packing), multiple-choice (the items are partitioned into classes and exactly one item of each class must be packed) and quadratic (objective) knapsack problems, as well as the multiobjective and the precedence constraint knapsack problem. The stochastic aspects and the on-line version of the knapsack problem are also discussed. For most of the problems, both exact solutions and approximation algorithms with guaranteed worst-case performance ratios are given.

On the whole, the authors present a rich amount of material, much of which belongs to the most recent advancement in the subject (up to June 2003). The computational experiments performed for exact algorithms and a number of concrete applications in industrial and economic problems provide helpful guidelines about which methods can be expected to work well in which situations for practitioners. This self-contained monograph is a valuable addition to the existing literature on knapsack problems. It will certainly make an excellent reference for researchers in combinatorial optimization. Specially, it may serve well as a starting point for the vast literature and more in-depth treatments of the subject found in the references. In this regard, the libraries in this field should have a copy of this book on their shelves.

Reference

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Business Statistics: A Decision-making Approach

KD Smith, PC Fry, PW Shannon and DF Groebner

Pearson/Prentice, 2004. 896pp. £35.00
ISBN: 0131270486

Statistics for Business and Economics

P Newbold, WL Carlson and BM Thorne

Pearson/Prentice, 2004. 900pp. £50.00
ISBN: 0130293202

Business Statistics: A First Course

D Levine

Pearson/Prentice, 2004. 640pp. £41.00
ISBN: 0130782017

Basic Business Statistics (International Edition)

ML Berenson, DM Levine, TC Krehbiel and D Stephan

Pearson/Prentice, 2004. 880pp. £50.00
ISBN: 013121649x

The aims of these textbooks are rather generic, it is hard by reading the preface material to differentiate the suitability of these books to anything other than a general business-related undergraduate cohort: they implicitly claim to be all things to all people. This is likely a result of their positioning in the large and lucrative North American Higher Education market, where the first 2 years are more general and a statistics module would be taken by students from a number of (perhaps related) disciplines, prior to later specialization. There are a large number of similar textbooks that are aimed at this market.

However, this does not help in selecting an appropriate textbook, nor does it necessary mean that they will be suitable for more specialized audiences. The key issue for

UK OR lecturers is whether these texts would be suitable for teaching their students, given that in the UK Higher Education system specialisation occurs earlier and so statistics courses are often delivered in the context of the discipline of the degree program (JORS is after all a UK-based journal).

This is a real issue in my experience. I work at the OR/Artificial Intelligence interface, based in a computer science department, and I teach statistics and research methods to computer science and information systems students. No specialist statistics texts for undergraduate computing students is available so I use a general statistics text. Needless to say it is not a completely satisfactory state of affairs—if only since it makes it harder for students to relate their statistics knowledge to their discipline. Therefore, removing some obvious North American references to produce an international edition does not necessarily mean that they address the greater specialization and discipline focus in the UK system. To examine this issue in the context of OR teaching, the coverage and depth of the textbooks needs to be considered.

Berenson *et al*'s text spends the first three chapters covering basic descriptive statistics; thereafter the next three chapters introduce probability and distributions. Chapters 7 and 8 cover the implications of the central limit theorem and their application in confidence interval estimation. Chapters 9 and 10 cover hypothesis testing, that is, *Z*- and *t*-tests on the mean and the χ^2 and *F*-tests for the variance, followed by some coverage of non-parametric methods (Wilcoxon Rank Sum and Signed-Ranks Tests).

Attention turns in chapter 11 to Analysis of Variance and non-parametric alternatives (Kruskal-Wallis and Friedman Rank Test). Chapter 12 covers the χ^2 tests on categorical data. Chapters 13–15 cover simple linear and multiple regression.

Finally applications are covered. Chapter 16 looks at time-series forecasting, chapter 17 decision making and chapter 18 statistical applications in quality and productivity management.

Two case studies are use through the text: the Web and Managing the Springville Herald. Also end of section questions are used effectively (as for all the texts here). Answers are provided only for half the exercises in the text, the instructor's manual provides the others.

Groebner *et al* starts in a similar way: the first three chapters cover data collection and descriptive statistics. Chapters 4–6 cover probability fundamentals and sampling distributions. Chapters 7–11 cover estimation hypothesis testing and ANOVA, but without the non-parametric alternatives. χ^2 tests for goodness of fit and contingency analysis are covered in chapter 12. Regression and correlation are covered in chapters 13 and 14.

Applications covered are as follows: forecasting time series in chapter 15, quality and statistical process control in chapter 17 and decision analysis in chapter 18 (on

CD-ROM). This text treats non-parametric alternatives as a separate issue and leaves coverage of them to chapter 16. Again frequent use of questions and worked examples is made throughout the text.

Levine *et al* begin with data collection (chapters 1–3) and again proceed to cover probability and the implications of the central limit theorem (chapters 4–6). Rather predictably hypothesis testing (Z -, t -, F - and χ^2 tests) and regression follow in chapters 7–10. Only two applications are covered: time series forecasting and quality and production management. Non-parametrics and ANOVA are not covered in this text; it appears to be a slimmed down version of Berenson *et al*.

Finally Newbold *et al* follows a similar pattern to the texts above, again non-parametrics are covered in a separate chapter. The main difference is in the additional coverage; both sampling and regression analysis are expanded upon to cover topics such as dummy variables, multicollinearity and heteroscedasticity.

It is evident with even a cursory examination of the above that the core coverage and structure is rather similar: descriptive statistics, data gathering and sampling, basic probability, discrete and continuous distributions, central limit theorem and estimators, confidence intervals, hypothesis testing (Z - and t -tests and χ^2) and regression. Outside of this core some differences in coverage between the texts occur, for example varying coverage of applications in Quality and Productivity Management, forecasting and statistical decision theory; I suspect that this is a reflection of the coverage in the authors' own institutions.

All of these texts tackle the issues in a fairly high level manner (eg no proofs of, say, the central limit theorem),

therefore these texts would really only be suitable 'as is' for a statistics/quantitative methods modules in a business degree (that perhaps later fed into an OR module), rather than a strongly mathematical OR degree. The coverage would need strengthening substantially for masters-level teaching and I would doubt that these texts are suitable for this.

The explanations in all the books are clear and effective (although I found the presentation in Newbold *et al* somewhat dry). Given that this is a competitive market, it is no surprise that pedagogical standards are high. All of the books support the use of common data analysis tools such as Excel, SPSS and MINITAB. Personally, I find this similarity between the texts rather bland—it would be nice to see a text that shakes up the standard presentation.

In addition, all these books provide a CD-ROM containing the data sets used, plus a copy of Prentice-Hall's support software, PHSTAT2: this is a collection of 50 Microsoft Excel macros. They also provide instructor support materials (eg slides, e-learning materials). This makes delivery of such teaching more straightforward. However, similar provision is available for similar textbooks in the market.

There is one aspect of this collection that I found potentially useful and could address the above concerns regarding specialisation. These books are part of the Prentice-Hall Just-In-Time Program in Decision Science which includes more advanced texts in Production Management and OR. This program allows instructors to in effect build their own textbooks drawing on the materials in all of the books in the series.

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