



Using the World-Wide Web in the teaching of economic

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1. Introduction

This paper explores the challenges and opportunities presented to teachers of economics and economic researchers when using the World-Wide Web (WWW) and other interactive tools in our curriculae.

During the past decade there has been a revolution in learning technologies in higher education teaching through CAL packages and through material on the Web. Economics as a discipline benefits hugely from this revolution, since there is a solid body of theory captured

in all standard introductory and intermediary textbooks. There is massive public interest in the acquisition of economic literacy. Well-known economists have rapidly moved to sell their expertise on the Web and become better known through Web exposure. No blockbuster American textbook, published by a major publisher, can expect to remain competitive in the international market without the support of a Web page and a computer-aided package.

The revolutionary impact of this for developing countries is the undeniable opportunity to access this first-world technology and information and to apply it to their own environment. The Web has levelled the playing fields. The challenge facing us is how to use this wealth of material intelligently and cost effectively to improve the quality of teaching and research, thus adding value to our product. Globalisation in education means that we cannot afford not to have our students familiar with the Internet - skillfully navigating the Web to extract quality information and becoming adept in using computer tools to be equipped to place material on the Web themselves. We need to reflect on where and how we can and should teach our students in the new environment.

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2. Using the Web in teaching economics

The WWW can be used for teaching and learning in a number of innovative ways. Central to our argument is that the Web is both an obvious distance-education mode, but it is also a means of adding value to an on-campus, mainstream education.

We can use the Web as a teaching tool at both undergraduate and postgraduate level; we can extend and enrich the subject matter and content of our courses, and we can provide current, real-world discussion of theoretical issues. As a virtual library, it extends the library resources available, opening up material from international research institutes, universities and centres.

Surprisingly, for the professional and student economist, much of what is on the Web is free, easily accessible and of a high quality. The challenge lies in finding the appropriate material.

The Web can be used to supplement, enrich and extend the standard economics textbook. One of the most difficult aspects of teaching Economics is to move the student from the textbook theory to real-world applications and events, so that economics becomes a meaningful everyday thinking skill that is constantly applied to real-world situations and events. Textbooks date rapidly where they draw on current macro-economic data. The Web facilitates this difficult-to-teach interplay between theory and application and constantly updates the current national economics statistics.

The WWW offers a research tool by providing raw statistical data, presentation skills and new methodologies. Material from the Web can be brought into the classroom through Power Point applications. We can access innovative thinkers on the Web. We are able to access both relevant, contemporary South African and international economic data and materials. It provides the opportunity to publish work in progress.

Perhaps the greatest strength of the Web as a learning technology is the open access to the network of Hypertext Markup Language (HTML) files, which offers the limitless array of links to sites of all kinds across the world.

Using the Web should become the first point of informational contact for the student over and above the normal lecture, whether on or off campus. The computer is a long way from

replacing the lecturer as the teacher, but we can relatively easily move to a situation where students will find course information, mark assessments, exercises, solutions and past examination papers on the Web. In the process, students learn a 21st century technology and are better equipped to take up careers in business and government.

In summary, the Web offers the following:

- Freeing the student from being limited to the traditional classroom interaction. The computer laboratory or personal computer becomes the moving classroom and thus changes the dimensions of time, space and individual aptitude to suit the student.
- Access to many types of learning technologies and strategies: simulations, mock examination papers, details of courses offered at other universities, computer-based communications and interactive learning.
- An integration of teaching and learning. Seated before a computer screen the student becomes responsible for his own learning, at his own pace. Simulations and interactive tests can be repeated to achieve improved understanding.
- A library on our desk through access to printed and electronic journal articles.
- Up-to-date, current economic statistics and data are readily available on the Web.
- The opportunity to access a rich array of professional sites devised by working economists. There is the potential to find top quality analysis, debate and problem solving.
- Accessing raw material statistical data sets compiled in major institutions, which the student can research, manipulate and use in innovative ways.
- Facilitates online communication, via e-mail and through online chat groups, and through 'ask the professor' facilities, with fellow students on other continents and with a wider range of mentors.
- There is an increase in the culture of openness with regard to information and access to information; breaking barriers between information rich and information poor societies.

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3. Exploring the use of the Internet by teacher and student

We wish to explore some of these elements and introduce our experience of these approaches. Some of our approaches are better suited to the lecturer, while in other instances direct engagement by the student is to be encouraged.

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4. Placing the Department of Economics on the Web

In developing its own home page, the Department of Economics at Wits University opens up a window on the Wits degree structure and what the study of Economics at this institution offers the prospective student. The Department showcases its staff, its courses, and its research programme in a frequently and easily up-dated manner.

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5. Development of courses using a specific Web site

At Wits, for the Economics Honours level (4th year), Mr Faud Cassim has developed a course based upon the course material found through the Nouriel Roubini Web page. Through this page students are directed to a range of contemporary material on the ASIA CRISIS (<http://www.stern.nyu.edu/-nroubini/asia>). This site was rated tops by the Economist (13/3/99). Roubini is a member of Clinton's Council of Economic Advisers and provides excellent information and analysis.

In 1998, Kathy Munro taught an Honours course on 'Eastern Europe and Russia in Transition'. This was a strongly contemporary and topical course, hence the Web became a primary resource in accessing current research, statistics, news items and commentary on change in Russia. Useful sites covered included the Swedish Research Institutes, the Washington Post, current Moscow newspapers (in English), the IMF and the United Nations. Thus material which would otherwise have been difficult or impossible to access in print was immediately available.

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6. Development of Web-based courseware

Lecturers can themselves create Web pages (to present their own course material) around content, statistics and the management of a course. Lecture notes can be accessed easily. At Wits, Dr Prabhat Vaze has placed his three courses (2 second-year courses in Development and International Trade and one third-year course in Environmental Economics) on the Web. Dr Vaze has placed overheads and access to links on the Web. The take-up rate is nearly 99% among students who have computers (estimated at 1/3rd of the 250 student body). He has found that, as a result of this innovation, a few students have requested on-campus Internet access. A complete set of easy-to-use and customisable tools is offered through packages such as WebCT. Prentice Hall is now offering WebCT through its Web site to staff who work with Case and Fair and adapt the online textbook material as each lecturer sees fit, so customising and personalising the material.

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7. Support material for the first-year textbook

Textbook publication is an industry and in Economics this is no exception. First-year introductory textbooks are sold throughout the world; the best of these books are either British or American and publishers aim to sell hundreds of thousands of copies at English language universities around the world. Thus a clear opening emerged on the Web to develop sites to both market and extend the textbook product. This gap in the marketplace was first picked up by the major North American publishers. Development costs are substantial with teams of professors, assistants, and designers of Web pages all at hand. The Web becomes the market place for the textbook and the better Web site possibly gives the specific textbook the market edge.

We shall discuss three such sites:

1. Our first year textbook in Economics is a standard book: Principles of Economics (5th edition) by Case & Fair (1998), published in the USA by Prentice Hall. Thus there is a range of support material to be found through the PHLIP companion Web site. This offers strong visual support to the textbook - encouraging students to work through sequenced tasks in logically arranged chapter objectives - the study guide, information on relevant current events and interactive exercises. A password is required to access

the 'faculty lounge', providing additional material and access to other useful sites, specifically aimed at the lecturer (<http://www.cw.prenhall.com/bookbind/pubbooks/casefair/>).

As an example when we perused the companion Web site for Case & Fair's chapter 20 on 'International Trade, Comparative Advantage and Protectionism', we were led to a coverage of the chapters Objectives, a Study guide review & quiz, a current events series of articles (e.g. 'Going Bananas: a US-EU Trade Dispute', an article for Time magazine of 8/2/99). This was followed by Internet Exercises encouraging students to submit their own work for publication on the PHLIP Web site and finally moved the student on to other Internet resources on international trade issues.

The research area of the PHLIP companion site offers access to tutorials on 'How to search the Web efficiently', finds 'Compendium Sites for Business Information', locates 'Business Information Search Engines', zooms in to 'the Best Search Engines on the Web', extends students' reading around European, Australian and US News Sources and, finally, gives access to library catalogues.

2. Michael Parkin's Economics, 4th edition, 1998, published by Addison-Wesley, is supported by Econ100, an international Web site for students of economics. This extensive site offers a series of learning tools (including a weekly quiz based on the books' chapters (at four levels). 'Reading Between the Lines' is a feature designed to extend the students' grasp of the application of economics to real world events. Weekly updated problems, debates, study tips and economic links all feature. Several utilities in the 'Talking Shop' component emphasise the interactivity capacity of the Web through a bulletin board, an online chat group, putting questions to the team of Econ100 teachers, and an Internet exchange to share views with other students. Downloads offer lecture notes, textbook chapters from earlier editions and a demo version of Economics in Action. Finally the site has a lighter side of 'fun stuff' - cartoons, jokes, games, etc. It is a rich and varied source for students at (<http://www.econ100.com/sitemap.html>).

3. N. Gregory Mankiw's Principles of Economics, 1998 is marketed through a Dryden Press/Harcourt Web site. Mankiw is a professor of economics at Harvard University, his textbook is relatively short, the style is direct and easy to read, with a strong policy and application approach. The Web site promotes the book and the author through specific resource sections for students and instructors. Interactive material is presented in quizzes, glossaries and mail lists. Reference material extends the range of facilities into the study guide.

We tracked, as an example, Chapter 9 which took us into applications on international trade, cyberproblems, chapter links, news summaries, a column for Fortune magazine (written by Mankiw himself) and chapter testing. A password limits entry to the instructor's resource section. This site is at (<http://www.harcourtcollege.com/econ/mankiw/>).

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8. Accessing top Web sites in economics

A further way of stimulating the undergraduate and postgraduate students is to encourage them to access the home pages of well-known working economists. These are the best brains in the business, so let's encourage our students to use the sites. The Web gives the student

direct access to the likes of Nouriel Roubini, Paul Krugman, Nicholas Economides, Hal Varian and Ed Yardeni of Morgan Grenfell.

The Economist (13/3/99) ranks the following five in terms of content, ease of use and appearance: Nouriel Roubini, Paul Krugman, NBER, Nicholas Economides, Hal Varian and About.com's Economics section (formerly Mining Co Economics). Other sites also rank their 'top' sites, hinting at a felt need for quality assessment. Econ100 lists as its top 10 economics Web sites (in order of preference): Office for National Statistics, HM Treasury, The Bank of England, Department of Trade and Industry, the National Institute of Economic and Social Research, OECD Statistics, Eurostat (the Statistical Office of the European Communities), International Statistical Organisations, British Official Publications Current Awareness Service and WebEc.

Paul Krugman's site (web.mit.edu/krugman/www) is well worth a visit. Krugman is a professor of economics at the Massachusetts Institute of Technology (MIT). Renowned for his prolific pronouncements of doom, gloom and appropriate policy on current topics from Japan's economic woes to inflation, Krugman's site promotes himself and his books, and also leads the student to provocative thinking.

About.com Guide to Economics is run by John S. Irons, a Ph.D. student in economics at MIT. The site is dedicated to the subject area of economics. 'You can think of us as a search engine like Lycos, or Web Crawler, or as an Internet listing site like Yahoo, but powered by qualified people rather than robots or full-time Web indexes.' (J.S. Irons: <http://economics.miningco.com/bladgate.htm>). This site offers three services, namely a categorised listing of economics related Web sites, a bi-weekly feature on economics, economic policy or Web resources in economics, and the tools to participate in an 'economics interested' community from networked chat facilities to an economics forum.

The Economist itself has a quality Web site with a worthwhile free area, but the Web site is a marketing tool and invites the reader to subscribe to the Web version of the publication. Nonetheless, The Economist offers a free e-mail subscription to summary pages of politics and business and offers a spinning globe screen saver with quick summary economic data of many countries.

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9. **Accessing material developed by leading researchers in computer technology**

In Britain, there has been a massive investment in the development and application of technology to teaching/learning and research at tertiary level during the past decade, and the Web opens this research to everyone who is online. We are able to 'piggy-back' on first-world, reputable, quality academic development work and thus, as a country where resources available for higher education are fairly static, we can close the knowledge gap.

Situated at Bristol University, the Institute for Learning and Research Technology (ILRT) is a national centre funded by the four UK higher education funding bodies for this purpose. It is host to more than 34 funded projects in learning and research technology. In the field of Economics, the Institute is the home of the CTI in Economics. CTI stands for the 'Computers in Teaching Initiative', which comprises 24 specialist centres, each meeting the needs of a specific subject area.

CTI Economics provides an extensive Web service accessing available software material

through catalogues, teaching material updates, advice sheets on a variety of topics (e.g. the use of spreadsheets), information about CALECO (Computer Assisted Learning in Economics) annual conferences, the online journal CHEER (Computers in Higher Education Economics Review). The home page of CTI Economics invites students to browse recommended Web links, join an e-mail list, and provide feedback with an online survey about learning technology in economics.

CTI Economics Webmaster's Link of the Month introduces the academic economist to the diversity of Web resources that are available, adding further links to 'more sources' on subjects such as introductory teaching material, course Web sites, online sources of economic data, educational applications of Java, sources of working papers and research, online sources of economic data, online glossaries, online statistical textbooks, and macroeconomics teaching material.

The CTI Economics Online Teaching Material page leads to sites on macroeconomics, microeconomics, statistics, online tests and exams (interactive and non-interactive), glossaries, and other subjects.

Recommended Web links yield CTI Economics' recommended sites of interests to economists, covering statistics modelling and datasets, working papers and institutions and interest groups.

CTI Economics Online Teaching Material for Introductory Economics leads to a further rich vein of sites perhaps more useful to the teacher than the student.

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10. **Specialist search engines**

Clearly a major difficulty for a novice student 'working' the Web is the general nature and lack of specificity of the obvious search engines. Searching is time consuming. But help is at hand through specialist search engines in economics.

Through the WWW Virtual Library, we find both RFE (Resources for Economists on the Internet) and WebEc (WWW Resources in Economics). RFE is written by Bill Goffe of the Department of Economics and International Business, University of Southern Mississippi, USA, and is mirrored in Britain, Japan and Australia (click on the flag). RFE is sponsored by the American Economic Association and lists more than 900 resources of interest to the practising and academic economist. Its hyperlink text to 'more' leads to an extended description of RFE

Goffe selects items that offer either a substantial amount of information or are specialised. RFE covers conferences, consulting and forecasting, data, departments and universities, jobs, grants and academic advice, mailing lists and Usenet, news media, organisations and associations, other Internet guides, scholarly communication, software, teaching resources and 'neat stuff'.

A somewhat broader array of business and economic resources can be accessed through WebEc, which is an effort to categorise free information in economics on the WWW and is maintained by Lauri Saarinen of the Electronic Commerce Institute, LTT Research Ltd., Helsinki School of Economics in Finland and is mirrored in the USA, Britain, Finland and Japan (<http://netec.wustl.edu/WebEc/main.html>).

WebEc is part of the NetEc project, which is a collection of projects that aim to improve scholarly communication in economics via electronic media. The aim is to make available on the Web as much information relevant to Economics as possible. The NetEc search engine also provides a listing of economics courses at universities to be found on the Web. A search on 22/8/99 produced 39 records for economics courses and 40 records for economic history links.

The other projects are: BibEc (printed working papers in economics), WoPEc (electronic working papers in economics), CodEc, BizEc and HoPEc (home page papers in economics).

BibEc is a collection of bibliographic information about printed working papers. They represent early issues of recent research or work in progress. Over 40 000 papers from almost 500 series are available.

WoPEc is an equivalent collection for electronic papers. It offers bibliographical information (author, title, abstract, etc) and details of all electronic manifestations of the paper which can be accessed through hyperlinks.

RePEc stands for 'Research Papers in Economics' and is the site of a group working on the provision of data about academic economics (<http://netec.wustl.edu/RePEc/>).

Another useful link site is ECONLinks, which was developed by Scott Simkins of North Carolina A & T State University, to provide easy access to basic economic and financial information available on the WWW for students in economics and business courses. It covers indexes and directories, current news, business news, current economic indicators, financial market information, economic analysis and forecasts, economic data, Federal Reserve banks, business magazines, US government agencies and sites, US government publications, international resources, policy institutes, student resources, teacher resources and new links (<http://www.ncat.edu/~simkinss/econlinks.html>). Its resources for economists are categorised as follows: launching pads, economists, economics departments and stuff, economic education, experimental economics, unusual stock markets, macroeconomics, microeconomics, labour, environmental law and economics, international, comparative economic systems, money and banking, econometrics, and think tanks.

EcEdWeb is another American-based directional Web site. This is an economic education Web site, whose mission it is to provide support for economic education in all forms and at all levels. Sponsored by the Campaign for Economic Literacy and based at the University of Nebraska at Omaha Centre for Economic Education, it has a menu offering access to materials for teaching economics. It appears to be pitched at a wider spectrum of users (<http://ecedWeb.unomaha.edu/home2.htm>).

The Scout Report for Business & Economics is a publication of the Internet Scout Project of the Computer Sciences Department of the University of Wisconsin-Madison, targeting academics, students and librarians in business and economics. Issued bi-weekly, it offers a selective collection of Internet resources in the field. Its issue for 26/8/99 (vol. 2, no. 24) offers annotated descriptions of Web sites in areas of research, learning resources, general interest, current awareness, new data and 'in the news' sections (<http://scout.cs.wisc.edu/report/bus-econ 1999>).

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11. **Finding other university economics departments on the Web**

Economics department directors can be found at:

- <http://www.er.uqam.ca/nobel/r14160/economics.index.html>
- <http://castle.uvic.ca/econ/depts.html>
- <http://price.bus.okstate.edu/econdept.html>

Another link can be found through ERIRC which lists all Economics Departments, Institutions and Research centres on the internet. This collection lists over 1500 institutions and is produced by Christian Zimmerman of the Universite du Quebec a Montreal).

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12. **Accessing economic statistics available on the Internet**

A link accessed through Econ100 (<http://www.library.ewu.edu/help/economicstats.html>) leads one to a site showing the coverage of economic statistics available on the Web. It links to FEDSTATS (aggregate data for the United States), CIA (aggregate data for foreign countries), United Nations, World Bank, foreign government data sources and international statistical agencies. This site also leads the diligent searcher to the economic statistics briefing room of the White House, Business and Economic Numeric Data (megasite of links to economic statistics) and to statistical resources on the Web, Comprehensive Economics (megasite of links with annotations').

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13. **Accessing journal articles**

WebEc offers a list of economics journals and using hypertext enables access to all journals on the list. A series of codes indicate search facilities available for specific journals and where full-text papers are downloadable (<http://netec.mcc.au.uk/WebEc/journals.html>).

(Econometric journals online are accessed at <http://www.eur.nl/few/ei/links/#journals>).

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14. **South African material on the Web**

One extremely useful site is the home page of the United Nations development Programme on South Africa, which identifies South African Resources in the following categories: political, economic, government, research and development, tourism, and news resources (<http://www.undp.org.za/misc/resources.html>).

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15. **Search engines for research**

Useful (British-based) social science search engines, including economics, are offered through four new Web services designed to support social science teaching and research. They are: SOSIG, Biz/ed, Grapevine and REGARD. We can immediately access all of this material on the Web.

1. SOSIG is the Social Science Information Gateway, an international service based in the UK, which holds thousands of resource records in its online catalogue, offering details about and links to many different kinds of resources (e.g. electronic journals, reports and papers, educational software, electronic newsletters, digitised books, scholarly mailing lists and archives, databases, bibliographies, and home pages of key social science organisations. This is the Internet equivalent of an academic research library for the social sciences. It is a filtered service as only high quality resources that support education and research are included, written in any European language, and with a particular emphasis on European resources (<http://www.sosig.ac.uk/>).

SOSIG is also linked to the European Union's DESIRE (Development of a European Service for Information on Research and Education) project. Further information about DESIRE is available at <http://www.desire.org/>.

2. Biz/ed is an Internet service catering for the needs of students, teachers and lecturers in the fields of economics and business. Biz/ed points to quality educational sites and primary materials (case studies, worksheets and substantial datasets). No graphics are used, so download time is minimal. Biz/ed provides access to data donated from authoritative providers such as ONS and Extel, new content commissioned from practising teachers, tutor support material acting as a resource bank giving ideas for using the Internet in the classroom, company facts, the virtual factory (Cameron Balloons) and a listing of business and economics, Internet resources. Information is classified, browseable and searchable. To explore Biz/ed, access it on <http://www.bized.ac.uk/>.
3. Grapevine is a new Web service offering an online source of jobs and training opportunities for social science researchers in all sectors, launched in March 1998. Researchers can make their CVs available online or make use of the Likeminds section (a 'classified' section) for brief announcements or call for contact with like-minded individuals and those seeking or offering skills, expertise or information. Information is provided free on Grapevine. Advertisers pay a subscription. Explore Grapevine at <http://www.grapevine.bris.ac.uk>.
4. REGARD is a functional bibliographic database accessible via the Web. It provides a key source of information on ESRC social science research awards and products. Research products include anything from book chapters and journal articles to television programmes, interviews or software. This is a collaborative project of the ILRT and the University of Bristol Library. Explore REGARD at <http://www.regard.ac.uk/>.

Other research resources (JISC, Electronic Libraries Programme, ADAM, Ariadne, BIDS, BOPCAS, BUBL, COPAC, The Data Archive, EDINA, HENSA, IRISS'98, MIDAS and RUDI) can all be explored through <http://www.ilrt.bris.ac.uk/training/socsci/sampler.html>.

These open up a vast range of quite amazing resources in Britain and Europe.

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16. **Computer-assisted learning (CAL) packages**

This section introduces two CAL packages and considers the usefulness of computer assisted learning packages relative to value added by the Web. Stand-alone packages have the

advantage of a clearly defined product, which can be introduced to the student in a computer laboratory situation with a defined purpose. The initial investment can be high (both the cost of computer hardware and the software) and the product may become dated. Web-based approaches also have initial investment costs; but via investment amortised in the sale of textbooks to a wider (first world?) market appear to be somewhat lower. In the long run the possibility exists that the Web based approach will supersede the independent CAL package.

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17. **Economics in action**

This stand-alone interactive Dos based Novell system software package was developed in tandem with Michael Parkin's textbook Economics (Addison-Wesley). The package has been available for student access at Wits on the mainframe for the past three years. It was introduced when the textbook was prescribed as the standard first-year text in 1996. We consider it to be the most user-friendly, cost-effective, interactive tutorial computer-based package. Interactive graphs cover 17 modules of micro and macroeconomics. In 1999, the Wits Department actively encouraged student usage by allocating a designated tutor in a computer classroom in our Educom library, to offer students an introductory tutorial in using the package. Students (all 1200 of the group) were supplied with a written introductory guide to the package and were then invited to have their first computer lesson in a supervised classroom situation. Each student was offered an hour-long tutorial. The use of the facility was voluntary, and the offer was not taken up by as many students as we would have liked; we estimate that approximately 250 students attended these classes. To assess the added value, we would need to measure attendance against performance and consider the various reasons for non-attendance (e.g. advanced computer students who would not require such support, students who consider a computer package as superfluous, or students who bought their own copies).

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18. **WinEcon**

The star software computer package to come out of the years of research in the UK at the CTI Economics is WinEcon, which is now in its 5th edition. Although developed as a computer-based learning package to cover the whole of the syllabus for the first year's degree courses in economics, Blackwells, which markets the product, has also published a WinEcon Workbook as a user's companion. It is a quality package which has won numerous awards.

Wits first looked at the possibilities of introducing WinEcon in 1995 but the high price for overseas institutions (then, approximately R28 000) for one year's usage and the inadequacy of our hardware, plus the fact that this was a new product, led us to conclude that we could not introduce it at that stage.

WinEcon is now extensively used in Economics Departments in Britain and the relatively inexpensive student version on CD-Rom (only 50 pounds stg) makes it a winner for British students. It is an interactive package with self-assessment questions, powerful graphics, a comprehensive glossary and with references to four major texts (Begg, Parkin, Sloman and Lipsey). But obstacles and difficulties exist but the overall response has been positive.

Running parallel with WinEcon is the development of a Web-based product, WebEcon.

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19. **What are the drawbacks/limitations of using the Web?**

Our conclusion was that the advantages far outweigh any disadvantages. We do regard the Web as the most significant teaching and learning opportunity of the decade. The Web is indeed a rich, versatile resource filled with quality material.

What are the drawbacks?

1. **Likely cost implications:** A university needs to be aware of the initial hardware costs. A recent estimate calculates a charge of R800 per year per student in hardware costs, (placing four students at a computer); this cannot readily be absorbed into course fees.
2. **Time:** Both student and lecturer need to spend considerable time on the Web to master the material; waiting for connections to be made for material to appear on the screen; to pass through the learning experience of useless sites.
3. **Repetition:** There is considerable overlap in searching for appropriate economics sites. Sites are often cited by more than one compiler and will appear several times. This could lead to confusion.
4. **Eurocentrism:** Much of the material is indeed strongly 'first world' - we can readily access British, American, Australian, European and Japanese sites. But it is a fact of life that the media world is dominated by first-world interests and subjects. Finding material on developing economies, eastern Europe and Russia simply takes longer, more diligence, more staying power.

South African material is not readily integrated into the specialist search engines in economics. These search engines have been compiled on a voluntary basis by dedicated enthusiasts and hence have grown by slow accumulation of sites.

5. **Levels:** Then there is the question of the appropriate level of material, especially if accessed through the general search engines. It is daunting for the average undergraduate student to sort through the irrelevant sites. Some economics material is directed either at the general public or at the secondary education level.
6. **Distractions:** There is both a danger and an opportunity in the 'medium becoming the message', as students, through pursuit of knowledge in one discipline, economics, are taught the fundamental approaches to accessing, organising and assessing information in a coherent and systematic manner. Logical linking of sites, searches conducted for a purpose, a careful review and assessment of the quality of a site and the information it provides all develops the students methodological and critical faculties.
7. **Computer literacy prerequisite:** Students do require some computer literacy skills, such as being comfortable with using Windows, handling a mouse, downloading material, finding their way around the Internet. These are not naturally inherited skills. Some colleagues argue that the investment in this type of teaching is too great for the likely return and that students will remain better served by the use of more traditional methods. We reject this argument as a rejection of the Web as a teaching tool will surely widen the gap between first- and third-world status: our students surely deserve exposure to the new technologies.

In directing students to the Web, there is a clear need for guidance, some

training and pointed direction. Students can be easily distracted into less useful, more fun pages. So the challenge is to keep the student focused.

8. Cost factors: Wits University currently spends R2 million on services from the service providers. South African costs of band access are far too high. There are two possibilities here: a united tertiary education campaign to reduce the cost of bandwidth provided by Telkom and stronger appeals to donor/NGO funding for assistance in covering the basic costs.

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20. **What opportunities exist for inter-university cooperation?**

Finally, it is worth considering how we might improve the capacity of South African universities to make more effective use of the Web. The following are some tentative suggestions.

1. Create a network of SA Web economics enthusiasts.
2. Integrate South African materials and sites into British and American search engines.
3. Encourage contributions to overseas journals such as CHEER
4. Develop our own authoring capacity
5. Develop South African computer-aided learning materials
6. Encourage discussion and input into local conferences about teaching and research methods in economics. A recent CSD study on economics (work in progress co-ordinated by Harry Zarenda) revealed diverse standards and interests across the range of representative universities surveyed. Wider use of the Web and communication through the Web could lead to convergent approaches to the study and teaching of economics.

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21. **Conclusions**

The Web has opened a world of information for the professional and student economist. Despite all limitations of speed, time and costs, the teacher and researcher must rise to the challenge of introducing the student to this rich, diverse and exciting resource. It offers the means of eliminating the information gap, erase the difficulty of finding library resources and thus raise the quality of what we offer our students and what we in turn can expect from our students.

Perhaps we should allow Adam Smith to have the last word, in mentioning the jokes about economists and economics Web sites (compiled by Pasi Kuopamaki of the Bank of Finland) at <http://netec.mcc.ac.uk/JokEc.html>. Who said economists were dismal?

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