

can be set up so that each student's scope is recorded. This informs the instructor if certain concepts and/or problems are troublesome to students.

Last, the instructor should utilize concepts familiar to students (having already taken at least introductory agricultural economics or economics) as examples on how calculus can be used in agricultural economics. For instance in a production economics course, marginal physical products and output elasticities are useful calculus examples. In a marketing and/or prices course, price, income, and cross elasticities can be expressed and solved for by calculus. This should be done soon after completing lectures on calculus to reinforce these mathematical concepts.

The above comments apply especially for agricultural economics courses that do not require calculus as a prerequisite. For those agricultural economics courses that require calculus as a prerequisite, the amount of class time spent reviewing calculus can be reached. For these courses, assignment of completing the calculus workbook may be sufficient for reviewing basic calculus.

Summary

Our paper suggests a way to increase the quantitative skills of agricultural economics undergraduate majors. We propose utilizing a computer programmed calculus workbook as a supplemental instruction source. Our experiences suggest that the workbook reduces the amount of instruction necessary to adequately teach basic calculus, motivates students to use microcomputers and stimulates the learning process.

The workbook itself should not be viewed as a panacea. Each agricultural economics department has individual situations regarding mathematics requirement(s), program directions, course selection and availability, microcomputer accessibility, and other considerations. Regardless of the situation, the workbook and more broadly, the concept of computer assisted instruction serve as tools to enhance college curriculums.

The workbook concept can be easily extended for usage in other classes. For instance, the calculus workbook can be expanded and used in graduate courses. This would involve including more rules of differentiation, e.g., quotient rule, exponentials, etc. Also basic optimization procedures using the Lagrangean technique can be incorporated. Another example would be to develop workbooks for "hands on" use of linear programming and regression.

Notes

¹PLATO is an acronym for "programmed logic for automated teaching operations."

²Conversion for IBM and IBM compatible usage is underway.

³Copies of the workbook are available upon request.

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Copyright Law Impact on Microcomputer Use

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Computer Software in Agriculture

As microcomputers continue to proliferate and become more important in agriculture, educators must understand copyright laws if they are to use software effectively and legally. Word processors, databases, spreadsheets and agricultural software are all used to provide students with practical computing experience. As a result, copyright laws effect which software packages are chosen for the classroom, and methods of copy protection create special problems in the classroom setting.

The issues surrounding copyrighted software have effected the computer industry for many years, but now members of the academic community must learn about these laws. Professors are presently facing these problems as they design databases and spreadsheet templates using commercially prepared software which is copyrighted. The problems presented by students copying software also require an understanding of copyright law. Moreover, as professors develop agriculture software a knowledge of copyright law and copy protection will help protect this software from unintended misuse.

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Copyrighting effects the software educators choose for the agriculture classroom. For example, in the College of Agriculture's computer facility 14 microcomputers are connected to a CORVUS Constellation Network Systems. Downloading a program from the hard disk to 14 simultaneous users would be a clear violation of copyright laws; thus, the College purchased 14 disk drives and multiple copies of the software. Clearly, choices can not be made solely on considerations of availability, utility and price.

Copyright Law

Copyright is the owner's exclusive right to make and dispose of and otherwise control a literary, musical, or artistic work. Since 1909 the United States has had a Copyright Law that has governed copyrighting for the country. In 1976 a new copyright law was passed; it mainly extended the length of copyright protection. The corporate owner's copyright was increased to 75 years. An individual owner's protection was lengthened to life plus 50 years. The new bill also went a long way in resolving the question of "fair use" of copyright works by spelling out guidelines for classroom and library photocopying. Software copyrights were further protected by the Software Protection Act which was incorporated into the Federal Copyright Law in 1980.

Relationship to Computer Software

Since personal computers have gained a foothold in agriculture, and in our society, the whole area of copyright law and its relationship to software has become significant to the computer industry. This is simply due to the terms of the licenses that accompany the software and to the loss of revenue that software piracy represents to authors, software houses and publishers.

The licenses that accompany the personal computer software are referred to as "shrink-wrap" licenses since they are usually packed just under the plastic wrapping that surrounds the software. A tag on the outside of the plastic wrap claims "that when you break the seal to extract your purchase, you have agreed to the terms of the license." (1) Many legal experts feel that this agreement is not legally enforceable because the buyer has nothing to say about the terms and did not have access to them before purchasing the product. In contrast, negotiated licenses which are signed by the buyer and the vendor are regarded as legally more binding.

Cost of Piracy to Industry

The market research firm FUTURE COMPUTING recently reported that for every copy of a program sold, one copy is stolen. This loss of sales cost the software industry \$1.3 billion in revenues between 1981 and 1984. It is estimated there will be at least an \$80 million loss to the industry in 1985.

Technology makes it easy to copy all sorts of products. The estimated cost to copy a 300 page book that would sell for \$20.00 is a fraction less than the cost

to purchase it. The cost to copy records and cassettes — audio or video — is reasonable enough even though the quality of the duplicate will never be quite as good as the original. However, the cost to copy a \$700 program is the cost of a disk (\$1.00) and the time required to copy it (60 seconds); furthermore, every copy is as good as the original. Thus the incentive to pirate software is much greater.

Part of the regulations effecting copyright consider the amount of copyrighted work being duplicated. Copying a small portion is permitted, while copying an entire work is forbidden unless the work is small. (3) Computer software is unique in this respect. Rarely is a small portion of a program useful. Thus violating copyright law is especially tempting when using software.

Who is Copying Software?

PC World, a widely read personal computer trade journal, recently surveyed its readers to obtain some data on software copying. They found that 57 percent of their respondents had used "unauthorized" software which they defined as "any copy of a program that was made without the approval of the manufacturer." (4) In other words not strictly in accordance with the license agreement that accompanies most software packages. The rationale for using the illegal copies was illuminating and indicated that most users have convincing reasons for not strictly adhering to the copyright law.

Seventy percent reported that their illegal copying was confined to backups. Many users make illegal backup copies to protect themselves in the event that the original fails. In a survey of software producers conducted by Hoover and Gould a few years ago, it was found that 72 percent of the publishers provide no backup copies to their users.

Sixty-eight percent of the pirates wanted to try out the program they copied before buying it. Hoover and Gould's survey showed that 75 percent of the software producers do not permit previewing of their software prior to purchase. (10)

Fifty-one percent reported that they use a bit copy program to transfer software onto a hard disk. Flexibility of running their program from the hard disk was important to the pirates.

Forty-three percent had copied their business software to use on their home machines. They felt that it was "unreasonable" to have to buy a separate copy of a program for home. "When people buy books they can read them anywhere" (4) stated some of those surveyed. The licensing agreements generally specify that the program is to be used on a single machine.

Some of the other less valid reasons for pirating software were:

- a. The program was overpriced
- b. Copy was free
- c. Could not afford program

Overall, the results of the surveys suggest that the pirates are hardly outlaws and will generally pay for the

programs they want even though they feel that their needs are not being met fully by the software industry. Certainly similar motives exist among pirates within most professions.

Software Industry Fights Back

The software industry is in turmoil over its loss of revenue. Every piece of software that is copied and used illegally represents a lost sale. Theoretically, a software company could have the most popular program in the industry and still go out of business; therefore, protecting software against piracy has become big business.

The Association of Data Processing Service Organizations (ADAPSO), a notable industry group, backed by Lotus, Microsoft, Ashton-Tate, Micropro and other major software corporations has launched a campaign to attack piracy. It includes technical protection of software, government activity, public education and enforcement. ADAPSO raised \$500,000 to back its aggressive campaign. Their government activity is centered around changing and clarifying the federal legislation dealing with copyright protection. The enforcement part of ADAPSO's campaign has joined forces with corporations against companies who are being sued for use of unauthorized software. Their education efforts are directed toward raising public awareness through advertisements, newspaper articles, mailings, etc.

ADAPSO hopes to instruct the retailers, user groups, corporations and the public on the reasons for adhering to copyright laws. David Sturtevant, the public relations director of ADAPSO, says that piracy is exercised by "people who wouldn't dream of walking into a store and shoplifting a piece of software." (14) He believes that people are just not aware of the crime they are committing and hopes to change the attitudes and behavior of our society.

The part of ADAPSO's program that is receiving most of the publicity, though, is the proposed hardware protection scheme called a "lock and key." A small box is plugged into the serial port in the back of the computer. A second box is connected to it, in which a group of "keys" will be installed. Each key is a sequence of circuits. An individual piece of software will contain its own unique key. The key on the software must match the key in the box if the program is to be run. The advantage to this scheme says Sturtevant is "There's no protection on the disk, and you can install the program on a hard disk, or make backup copies. And you could access the software on a local area network." (8) This sounds good to many publishers, but it has a long way to go before it is acceptable as the standard.

To date no hardware vendor has created a device that adheres strictly to ADAPSO's scheme. Dallas Semiconductor Corporation in Texas has recently released a device that is consistent with ADAPSO's but not fully compatible.

There are a number of other methods that publishers use. Some include software code tricks in combination with special disks or hardware devices.

One of the more successful is the Flexlock system; it is sold by Media Systems Technology of Irvine, California, and is based on anti-piracy techniques created and licensed to MST by Software Systems of Santa Clara, California. The publishers deliver their unprotected programs to MST where the Flexlock software is compared with the original program on a new disk. When the disks are sold to the end user they can be copied a fixed number of times. This enables the users to make backups but the backups cannot be copied. This system is not one hundred percent effective but deters all but the professionals.

Another fairly well known protection system is Vault Corporation's Prolok. It consists of a physical "fingerprint" stamped on the disks the company sells to the software publishers. Each time the user invokes the software it checks for the fingerprint and will not work unless the imprinted disk is in the drive. Lotus Corporation protects its products with Filelok, a related Vault product.

The software manufacturers are far from agreeing on the ideal copy protection system; furthermore, even those who belong to ADAPSO are not fully supportive of the lock and key scheme. Other groups such as the Microcomputer Managers Association, PC managers from 50 companies, have strongly opposed ADAPSO's system. All vendors want protection against copyright infringement, but a large majority find the proposed devices cumbersome and unacceptable. They also fear that their users will turn to similar products that are not protected and less burdensome for them to use. This debate indicates that no protection system is going to serve everyone's needs and that the battle against piracy needs to be fought on a different battleground.

Proposed Solutions

A number of vendors and corporate users have devised a workable and logical solution: site licensing. This is an agreement that allows the user to pay a one-time fee to the vendor for the right to use and copy a particular software package throughout an installation. Site licensing is especially promising in educational settings because damaged or stolen software can be replaced inexpensively. Site licensing has been standard operating procedure for mainframe software manufacturers for many years, but only recently was considered for microcomputers.

As microcomputers have proliferated in large organizations such as corporations and universities the standard "shrink-wrap" licenses and pricing for individual copies of personal computer software have become an important issue. The site licensing solution seems to be reasonable for both parties. It was engineered initially by the smaller companies trying to gain a foothold in the market place by meeting the needs of the consumers. The larger companies ignored

site licenses but more of them are succumbing regularly. Recently Micropro and Multimate Corporations (word processing vendors) offered site licensing for their products. Lotus Corporation is still holding out, but in the July 9, 1985 issue of *PC Week* there was an article that indicated that they are reevaluating their "tough stance on site licensing." (11)

These licenses vary in many areas including documentation, number of allowable copies, support provided, home copies for employees, per copy charge, etc. They generally however offer substantial benefits to both vendors and organizations. Vendors receive large advance payments for their products and users substantial discounts plus having "the license to copy." Site licensing effects the choice of software in agricultural setting. Educators may choose Multiplan over Lotus because the Microsoft Corporation (Multiplan vendor) is more amendable to site licensing.

Site licensing does seem like the solution for many organizations but still does not satisfy some of the needs and perhaps "rights" of the single software product consumer. The need to have a backup and preview software will not disappear. The vendors must succumb to those needs just as the pirates must not copy software illegally.

Summary

In spite of all the efforts to combat piracy it is important to note that so far all of the legal battles over unauthorized copying has been confined to corporations. Lindsay Kiang, legal counsel for Lotus Corporation, says that they have "sued large corporations that tolerate or encourage copying. If (the copying) isn't blatant or organized, we often handle the matter through correspondence."⁸ To date Lotus has filed four suits none of which has gone to trial. They have all been settled out of court and the details of the settlements have been kept secret.

This does not indicate that we in agricultural education should fearlessly copy software or condone it. Instead, we should work together to lobby for site licenses for the software that best fits the needs of the agricultural community within our university and more realistic policies for providing backup copies and on-approval purchases for the single software product consumer.

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INTERNATIONAL AGRICULTURE

An Overview: Short-term Educational Consultants In International Agriculture

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Short-term consultant assignments can be operative, challenging, educational, and can have lasting impact when contracted agricultural professors who participate in international short-term assignments generally contribute to the overall educational programs at their respective institutions by being open-minded, tolerant, worldly, and humanitarian. Their reasoning, thinking, and dialectical views tends to be broader in scope as they advise students, teach classes, plan programs, serve research, and perform other important academic responsibilities. Involving agricultural professors in short-term consultant assignments offers many other opportunities to faculty. They can learn to appreciate and understand the characteristics of other cultures; learn to speak a foreign language; acquire financial remuneration for their affiliated institution; recruit international undergraduate and graduate students; enhance their institutional image; and advance the capability of institutions to participate in long-term projects abroad. Hence, short-term international assignments can have a two-way impact on the understanding of people and societies, both domestically and internationally. The words of the late Eleanor Roosevelt best summarizes this concept: "Understanding is a two-way street."

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