

FACTORS IN ESTABLISHING A BEGINNING COMPUTER COURSE

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Computer classes are becoming an expected part of the teaching day of many secondary business teachers. If a course is not already part of the curriculum, establishing a course becomes the responsibility of administrators and/or business teachers. A number of factors should be considered in setting objectives, determining course content, and evaluating the effectiveness of the course. Keyboarding prerequisites, ethical considerations, feedback from the employment community, and choices of hardware and software are factors that affect the course composition and organization.

Keyboarding Prerequisites

Many different materials are available for use by the instructor in a beginning computer class. There are spreadsheets, databases, word processing programs, graphics packages, and many other types of software. All of these software programs have a common factor, however. All require some keyboarding knowledge. Even with the use of a mouse, a student will need to input some information into the computer through the use of a keyboard. Computers are good for teaching introductory keyboarding, and keyboarding packages save students time and effort in computing their speed and production. Unfortunately, in a beginning computer class, there simply is not time to instruct students in proper keyboarding and still cover other relevant materials which should be covered. As Poole, Blank, and Zahn commented, "Often, haphazard planning for

computer instruction has resulted in students engaging in significant inputting with little or no keyboarding skills" (20).

If a student enrolls in a beginning computer class with no keyboarding skills, it can be assumed that he/she will have to enter data using the age-old "hunt and peck" method. At best, the student may become familiar enough with the keyboard to use two hands to "peck." The lack of skill reduces the rate at which the student can produce, and it also increases the chances of inaccurate typing. While the majority of the class is finishing up their word processing assignment, the "hunt and peck" student may be struggling to finish the first paragraph.

Teaching students who work at different rates is difficult enough in a computer class without attempting to teach students with greatly differing keyboarding skills. A better approach is to require some basic keyboarding skills as a prerequisite to the beginning computer class. Such a requirement does not mean that every student in the computer class must be capable of high-speed typing. What it does mean is that every student should be capable of touch typing. Their formatting skills may be rudimentary, but the students need to have enough skill to input data at a reasonable rate of speed. One semester of keyboarding would be sufficient to teach students all of the keys and build their speed to an efficient level. Then, when they enter the beginning computer class, the instructor will not have to waste valuable time going back over basic information. The class could move right into the materials they were expected to cover.

Ethics

A computing class presents numerous ethical decisions for students and instructors. Violation of copyrights, new ways to cheat, privacy, and a host of other conflicts make it necessary for instructors to establish some forms of controls.

Academic dishonesty is an age-old problem in many classes. If care is not taken to prevent it, the beginning computer class will be no different. In fact, the computer allows new and different ways for academic dishonesty to occur. Whenever a student's work is not handwritten, the possibility exists for one student to turn in a copy of another student's work. Computers make this process very easy. If an assignment is to type a business letter, a few keys will change a name and a second copy can be printed. It would not be possible to detect the copy unless an identical typographical error occurred in both letters. A possible solution is to require students to save their work on their data disk as well as on paper. While it is possible for students to copy files from disk to disk, this process is more time consuming and more risky from the student's point of view. Also, collecting student's disks at the end of the period would prevent their altering files overnight. Collecting the disks has other benefits as well. It reduces the odds of students coming to class without their disks, and it reduces the possibility that the disks will be damaged in lockers or book bags. By maintaining control of the data disks and the

printing process, the teacher can reduce the possibility of cheating, monitor work more closely, and impose penalties on those who copy files from another student or who do not do their own work.

As students become more proficient with the equipment and the technology involved in the computer class, the danger exists that they will attempt to use their skills in inappropriate ways. Computer hackers have infiltrated computer systems in various places, including the nation's defense system. While it is highly doubtful that beginning computer students will be capable of such advanced "hacking," they should be informed of the legal ramifications of such behavior. They may well be capable of using the computer to look at other student's data disks, an invasion of privacy which should not be tolerated. The teacher should make it clear to students that a disk is no different than other belongings. Disks are not to be pried into without the permission of the owner.

The biggest problem with student-related ethics in the beginning computer class is probably unauthorized duplication of disks. The problem may be as simple as copying someone's homework, or it may be as serious as copying a copyrighted word processing package. Such copying must not be tolerated. Users of microcomputers in the classroom should be made fully aware that they are expected to abide by applicable copyright laws. Information regarding the penalties which apply to copyright violations should be available to all students (Seilheimer 15).

Cases where people have actually been prosecuted for unlawful copying of software are either not common or not well publicized, because they often do not make the news. Because they have not heard of such cases, students may assume that copying a protected disk is acceptable. Making it clear that these actions are not lawful, in addition to being unethical, may reduce the likelihood of students attempting to make unauthorized copies.

The instructor in a beginning class is faced with many of the same ethical dilemmas students face. Students are not the only ones who try to make unauthorized copies. A lecture on why students should not copy disks is meaningless if the spreadsheet package they are using is a copy the teacher has illegally copied for them. Additionally, if students see the teacher making a copy of the data base package for personal use, it gives a clear message--it is okay to make copies; just don't tell anyone. Teachers should abide by the edict: "Discourage and refuse to support unauthorized duplication of software by students or educators" ("Computer Use" 20). Do not allow co-workers to use the school's computers to make illegal copies. Stopping all illegal copying may be impossible; but if beginning computer students are convinced that they should not make copies, the problem will be reduced.

Invasion of privacy is even more of a concern for instructors than it is for students. After students become comfortable with using the computer to process information, they may have personal information on their disks. Additionally, the

teacher may have told them to keep a journal or write personal letters as a class assignment. The teacher must respect the students' privacy when handling information they have stored. If a classroom utilizes a networking system, the teacher must ensure that it provides reasonable levels of security and privacy. Students should not be able to access one another's files on a network ("Computer Use" 19).

Another ethical problem concerns equal access to equipment. Letting the more capable students spend more time on the machines will only exaggerate the differences between them and the less capable students. Ethnic and gender differences should not affect access to equipment. Ethnic and gender biases should also be avoided in the software used in the classroom ("Computer Use" 20).

An area which can cause an ethical dilemma results from the instructor's reputation as an expert. An instructor may abuse the appearance of impartial expertise by working part-time for a software or hardware firm. The goals of an educator do not coincide well with those of a successful computer businessperson. Maddux and Cummings stated, "An entrepreneur is not qualified to impartially judge his, or a competitor's, product" (32). An instructor's opinion of what is best has tremendous impact on those who perceive that instructor as an expert. Therefore, the instructor must retain the position of impartiality. The choice of software used in the classroom could

be biased if the instructor profited from the use of certain brands.

Obviously, there are many more areas where ethical dilemmas can occur in a beginning computer class. However, if cheating, invasion of privacy, and illegal copying can be controlled on the student level, and copying, invasion of privacy, and computing entrepreneurship can be avoided by teachers, some of these problems will not occur.

Computer Skills Needed by Prospective Employees

Establishing the curriculum for a beginning computer class can be simplified by determining what computer skills prospective employers are looking for in new employees. Many methods exist for determining what skills businesses find most desirable. However, two simple methods which generate useful input from businesses are surveys and advisory committees.

The first of these methods is surveying local businesses about the computer skills they expect new employees to have. The questions in the survey can be separated into sections based on different types of skill. For example, one section of the survey can be devoted to information processing and business communications. Another section may concentrate on data processing and spreadsheets. Space should also be available for stating what types of software are preferred. A beginning class can be devoted to introducing students to various software packages rather than intensive training on any particular type;

but if only one type is taught, it should be the type preferred by businesses in the employment community.

The survey should be sufficiently flexible to allow businesses to include information which does not fit into any specific category. Another advantage of encouraging all prospective employers to answer the survey is the increased communication with these businesses. If students begin their computer education with instruction in skills needed in their employment community, they will be better prepared to enter the job market when they complete their education.

Using a survey will enable businesses to have some input about how students are prepared for their future. The instructor in a beginning computer class can "fine tune" the subject matter to include those topics most relevant in a particular area.

The second method of obtaining local business input into curriculum decisions for the beginning computer class is somewhat more difficult. It involves establishing a local advisory committee. Darrell Clemmensen stated, "... business programs that make good use of a well-organized advisory committee are most likely to be successful" (16).

The advisory committee should include members from the business sector who are familiar with the types of skills high school graduates have upon completion of their education. Additionally, a school board member who has some interest in the business programs at the high school should be on the committee.

The difficult part of establishing such a committee is finding businesspeople who have time to participate.

The uses of such a committee are numerous. Clemmensen mentions the following areas in which advisory committees are especially useful:

Reviewing the objectives of the competency-based business program to help ensure that students are attaining the competencies needed for employment

Reviewing instructional equipment and materials used in the program

Promoting the program to the public (16).

An advisory committee is useful for more than the beginning computer class; it is helpful for the entire business curriculum. However, in the computer class it can be particularly helpful. Since the field of computers has expanded so rapidly in the past few years, an instructor may have difficulty identifying the abilities currently in demand by employers. This advisory committee can help to identify the content that should be taught in the computer class. The U.S. Department of Labor, Bureau of Labor Statistics predicted, "Job growth in legal services and business services (advertising, accounting, word processing, and computer support, for example) will be exceptionally rapid" ("Tomorrow's" 3). Assuming that businesses in most areas will mirror this prediction, it is important for high school computer courses to reflect training oriented toward this type of work. Using input from an advisory committee is an excellent way to keep the curriculum on track.

Curriculum

The single most important factor in establishing the beginning computer class is the curriculum. Without a carefully planned curriculum, students will not learn all that they are capable of learning, and instructors will be unable to cover as much material as they wish.

A dominant question when addressing the curriculum is whether to teach software applications or programming. Lawrence Ullman stated, "Just as teachers would show students how to write with a pencil, today's teachers need to train students how to use a computer for practical tasks" (Germain 7). In a beginning class, the students will not need to learn BASIC or any other computer language. Learning computer languages and the technological side of computer operation is fine for an advanced class. However, the technology and languages used today may be outdated soon in the rapidly changing world of computers (Hill et al. 46). If students emerge from a beginning class with the ability to operate a computer at an efficient level, then the class has been a success. The need to learn a computer language before learning to operate software has practically disappeared in recent years. With the advent of software packages which allow word processing, spreadsheets, and file management, people can work effectively on a computer with no knowledge of the actual language or programming being used by the package. Poole, Blank, and Zahn recommended that "computer applications, rather than programming languages, should dominate instruction" (20).

When teaching computer applications in a beginning class, instructors should teach students how to operate the different types of software rather than training them on only one type. Even with extensive feedback from area businesses, instructors will use software different from that which is used in some business firms. If the students understand the concepts of using a word processing or spreadsheet package, they will be able to learn the specific software used by their employers. Teaching students the logic of software as well as how to use it for specific problems will leave them with more applicable skills which they can apply to a more specific software package after entering the job market. However, the software used in the classroom should be a well-known, widely used type so that as many students as possible will have the advantage of being familiar with the exact software used by their employers.

The concept of computer literacy implies that students should be able to apply skills learned in the computer class to topics other than computer education. A program in Lacey Township High School in New Jersey seeks to have students develop competencies in word processing, spreadsheets, and data base management so that they can apply these skills to the remainder of their coursework (Germain 7). The beginning computer class should leave students "computer literate." At the conclusion of the class, they should be capable of taking the skills they have learned and applying them to their own work or honing them further in advanced computer courses. The emphasis in the

computer class should be upon the process rather than upon the product used (Hill et al. 47). Defining computer literacy is somewhat difficult, but the California State Department of Education has identified the following three levels of computer literacy:

1. the awareness level--learning what the computer can do
2. the operational level--learning basic computer applications
3. the advanced level--learning more complex applications and programming concepts (Clemmensen 15).

The beginning class will enable students to achieve the first two levels of this definition of computer literacy.

Word processing in the beginning computer class should not concentrate on the typing process. As mentioned previously, students should be capable of efficient keyboarding before enrolling in a computer class. Therefore, the instructor will be free to concentrate on the actual applications of the word processing package. When the concentration is on ideas rather than on the typing process, students will be more comfortable with composing at the keyboard. According to the U.S. Department of Labor, Bureau of Labor Statistics, increasing numbers of professionals and managers are using word processors to generate their materials ("Clerical" 20). Learning to develop materials at the keyboard is desirable for everyone, not just secretaries. As such, students should be taught to create and compose at the keyboard. Writing materials in longhand before typing them is not an efficient use of time. With the advanced editing

capabilities offered by word processing packages, students will be capable of writing and editing on the computer just as they would on paper. Early in the course, students should be taught how to plan what they want to write. If they have a clear idea of what they want to say, the need for extensive editing will be reduced. Varner reported, "If the student is to compose reports and letters on the microcomputer rather than key in a previously written draft, the student must be able to plan before inputting the message into the computer" (18). Another benefit of teaching the student to compose at the keyboard is the ease with which materials are edited. When writing with pen and paper, students may be reluctant to proofread carefully because corrections either look messy or require extensive recopying. With the computer, students will find that editing is much easier. Varner has developed this sequence which can be used to help students edit their work:

1. Edit for content. If the content is not complete or correct, there is no need to edit anything else.
2. Edit for organization. In this step, the student checks whether the material is presented in logical order. The student will also have to decide whether the organization is effective for the intended reader.
3. Edit for style. Here the students look for conciseness, transitions, consistencies, style level, and tone.
4. Edit for spelling and punctuation. Most students start with this step, which is not effective because correcting words that may be edited out wastes time (19).

Roderick and Forcht stated, "research studies in productivity indicate that people can increase their levels of output by eliminating the preliminary pen and pencil step of

writing" (383). If students are reluctant to give up their traditional preparation methods immediately, instructors can introduce composing at the keyboard in stages. Once students become more acquainted with the process and they realize how much time is saved by working strictly on the computer, they will be more open to the new method.

When teaching word processing and composition skills, instructors have an excellent opportunity to promote a business English course; or, if no business English course is offered, they can teach students some basic business English skills. When the work students have done is easily correctable, they will be more open to correcting their work for proper English usage. Structuring the class so that proper English is emphasized will help to improve students' ability to write clearly and efficiently. Concentrating on the generation of ideas and the production of reports while using a word processing package will give students experience in actual use of the package. In a beginning level class, teaching students how to use a package to create will be of more use than training them on how to operate all the myriad details of one particular system.

Spreadsheets

In addition to word processing skills, students should be introduced to the computer's ability to process numbers. Instructors should use a spreadsheet package in the beginning computer class. The field of accounting is becoming increasingly computerized, and spreadsheet packages can simulate the types of

software used by accounting firms. The U.S. Department of Labor predicts, "Employment of accountants and auditors is expected to grow much faster than the average for all occupations through the year 2000 due to the key role these workers play in the management of all types of businesses" ("Computer" 3). Introducing beginning computer students to the types of software they are likely to be using in accounting-related fields can be of tremendous advantage. Students with an interest in math will also be interested in the use of spreadsheets.

As in word processing, the emphasis when using spreadsheets should be on the type of thinking required rather than on the intricacies of any one package. If students learn the patterns of operation which allow proper calculation by the spreadsheet, they will be capable of adapting to whatever type of spreadsheet package is used in advanced classes or in the job market. Use of the spreadsheet allows students to develop a better understanding of mathematical formulas as well as computers.

Occupations in mathematics and computer-related occupations are predicted to increase at a significantly higher rate than that of the job market as a whole through the year 2000 (U.S. Department of Labor, Bureau of Labor Statistics, "Computer"). Since many of these jobs require the use of a spreadsheet package, introduction to the concept of a spreadsheet in the beginning computer class will give students ample opportunity to develop an efficient level of operating skills before they are

required to use the package to perform particularly complex mathematical work.

The fact that the spreadsheet is capable of performing work as difficult as advanced accounting and statistics and as simple as a weekly budget allows the instructor a substantial range of difficulty. Assigning students to create a template for a program of their own choosing will build their knowledge of the software package as well as build their problem-solving skills.

Since nearly every type of work from farming to law requires some processing of numerical data, student interest in spreadsheet packages should be high. If allowed to use the package to create a program which is beneficial to themselves, students will learn not only the package, but the underlying reasons for using it.

Databases

The third major section of the beginning computer class curriculum is the database package. Word processing is an effective way to create documents, but a database is capable of managing entire files of documents. As society moves closer to operating "paperless," the use of database packages will increase. Students who plan to work in the clerical field will benefit directly from an acquaintance with a database package, as they are likely to use one when they enter the job market. Those students who are not planning to enter the clerical field should have the benefits of using a database explained. Bertanzetti uses a database game to build student interest. She establishes

a detective game in which students are given clues which they use to narrow a search for a "crime suspect." After entering their own personal data, Bertanzetti's students follow her clues through the database to select one of their classmates as the culprit in a fictitious crime (77). The more uses students see for the database, the more likely they are to develop an efficient working knowledge of the package. Another possible means of gaining student approval of the package is to allow them to develop a computerized address book. When it becomes clear that people other than file clerks can benefit from the use of a database, then the students will work on understanding the package.

Developing a curriculum which introduces students to word processing, spreadsheet, and database packages will prepare these students to continue with advanced computer classes or develop their skills on their own.

Software and Hardware Considerations

When establishing a beginning computer class, specific goals should be established prior to purchasing software and hardware. Establishing a sense of direction will enable the instructor to determine what types of equipment and software most closely match student needs and the school budget. Stallard reported,

"Don't select hardware and software until you've developed precise goals, and then test the application to see if it works as is or needs to be modified. Don't adopt any computer application on a wide scale until it's clear that the application solves the problem or achieves the goal for which you chose it in the first place" (44-5).

When goals are established prior to the inception of the class, costly errors can be eliminated. Use of surveys and local advisory committees can help determine part of the criteria needed to establish these goals.

Software

Since an instructor may not have much choice on the equipment used in the beginning computer classroom, choosing the proper software is vital to establishing the desired learning atmosphere in the classroom. Advice from the employment community can narrow the search for the brands of software used, but a number of options are still available. Some computer manufacturers supply a word processing package with their computers. Despite the savings in cash, this software may not meet the goals set for the class. Whatever software is chosen should be checked for compatibility with the hardware in the classroom. If a variety of machines are in use, the software package chosen should be compatible with each type of machine to avoid difficulties in production work and class instruction. The support given by the manufacturer should also be considered before purchase. The instructor should check with different manufacturers to determine policies regarding items such as backup copies, instruction manuals, teaching aids, and emergency phone lines. Seilheimer stated that an economic advantage can be gained by purchasing software which has been designed for educational usage. This software has all the capabilities of regular software but has either limits to the amount of data

which can be input or prints an identifying mark on printed copy (13).

Choosing software with menus can ease the learning process for students since these packages provide visual "clues"; but after the students have become familiar with the package, these same menus will slow down their production rate as they wade through menu after menu of well-known material. On the other hand, use of software which does not use menus may require posting of signs reminding students how to perform certain operations. Paying extra for features which will not be used in the beginning class is not practical unless the same software can be used in advanced classes.

Hardware

The choice of hardware may not be left to the teacher of the beginning computer class, but if it is, a number of factors should be studied. Once again, surveys and local advisory committees will provide input as to the type of capabilities they expect from potential employees. If possible, the schools computer programs should reflect these expectations. Seilheimer stated, "Microcomputers made by International Business Machines Corp. (IBM) have set the standard for the microcomputer market" (13). Since these machines have such a broad share of the market, they have a great deal of software available. While IBM machines are not inexpensive, a number of IBM "clones" exist which sell for less money and often offer increased power and/or equipment. These machines should be considered highly viable for

the beginning computer classroom. Another popular manufacturer is Apple Computers. An instructor should carefully evaluate what goals have been set for the class before purchasing hardware, because different machines are known for different areas of expertise. For example, at Lacey Township High School, Lawrence Ullman felt that Apples were not as efficient for word processing as IBMs because they required complicated keyboard commands to perform some operations (Germain 7-8). Matching the computers' abilities with the goals for the course should result in the proper choice.

After choosing the type of computer, the equipment for each computer should be considered. Some choices are 5 1/4 inch disk drives, 3 1/2 inch disk drives, and hard disks. Of these choices, the hard or fixed drive is the most expensive but will allow handling of software to be minimized (Augustin 23). Keyboard choices are minimized because most manufacturers include them with the purchase of the Central Processing Unit. Different types of monitors exist as well. Use of a high resolution monitor allows more comfortable usage if students are going to use the machines for a long period of time; however, in a beginning class, students will not be at the machines long enough to justify spending the extra money for this option. Color monitors are also available and should be considered if graphics are to be taught in advanced classes. Choosing a printer is a factor heavily influenced by budget. Dot matrix printers are reasonably inexpensive, and some are capable of generating

graphics. On the down side, print quality can be questionable, and the machines are noisy. Most letter-quality printers are not capable of producing graphics. Laser printers are capable of high speed letter-quality print and graphics, but these machines are still somewhat expensive. It should be remembered that more than one computer can be connected to each printer. If advanced computer classes will be using graphics packages, the printers chosen should be capable of this work. Otherwise, the choice of printers will be determined by the amount of money available for purchasing peripherals.

Network Considerations

Another hardware choice for instructors to consider is the use of a Local Area Network or LAN. A LAN uses a master file which stores the software used by all the terminals used in a room. Some of the advantages of this type of system are reductions in the need for multiple software copies and increases in the security of the system through passwords and other security devices (Norman, 27). Use of a LAN in the classroom requires consideration of both software and hardware, not one exclusive of the other. With a LAN, a master copy of the software is capable of operating all of the terminals. While this sounds like a tremendous advantage over purchasing multiple copies of software packages, it should be remembered that these devices are not compatible with all software packages. Network versions of popular software are becoming more available at a price which is lower per student than individual copies of

software, but other complications exist because some manufacturers remain unsure about this type of licensing.

Henderson and Maddux reported:

"Unfortunately, however, simultaneous use of a single copy of a commercial program on a number of computers would almost certainly be illegal. Unless the right to network the software is paid for, either by the school or by the firm offering the network, such a procedure would violate copyright law in precisely the same fashion as would purchase of one copy followed by unauthorized 'backing up' of the software for each machine in the lab" (30).

In addition to limited software, the LAN has other problems. Some networks are difficult to add new software packages to and others can cause problems with compatability of software packages. Loading the hard disk down to each terminal can take a significant amount of time from each class period. Finally, each additional piece of equipment in the classroom increases the chance that something won't function properly. Malfunctions are not serious if they are restricted to one computer--students can work in teams. But if the complicated wiring required to operate the LAN malfunctions, or if the hard drive develops difficulties, the entire classroom may be unable to work.

Summary

Establishing a beginning computer class requires a great deal of preparation. Determining ethical standards, gathering information from the employment community, and setting goals for the class takes planning and hard work.

Establishing a curriculum which teaches beginning computer students to be efficient with word processing, spreadsheets, and

databases will leave these students computer literate and capable of performing satisfactorily in an advanced computer class. They will also be capable of applying what they have learned to the types of work they are likely to encounter in their employment careers.

Choosing well-known software leaves students with the ability to use software in a greater number of locations. The ability to operate a software package which is not in use anywhere except the classroom unnecessarily limits student skills. The choice of hardware should also be a well-known brand. Increased availability of compatible software and greater availability of parts and servicing are two advantages of choosing a well-known brand. The use of a Local Area Network seems to add more difficulties than benefits. These networks influence decisions about software and hardware and may lead to some choices of materials which are compatible with the LAN.

Teaching students to operate the software packages and showing them how to apply these materials to their work and prospective jobs should be a first priority for instructors. In a beginning class, the students should not have to master every intricate detail of any particular software package. If they are capable of operating the packages at an efficient level, they have accomplished all that a beginning class should accomplish. Concentrating on the ideas behind the work will not only increase efficiency, it will also help to prevent the computer class from becoming a more advanced typing class. Understanding of the

underlying ideas behind the use of the software will also help students develop their problem-solving skills rather than concentrating on their input skills.

Establishing a beginning computer class is not an easy task for the instructor. Many decisions must be made about software, hardware, and curriculum. Financing the purchase of software and hardware is a major consideration. The "model" classroom may be beyond the financial means of the school. Therefore, the decisions of the instructor, to the extent he/she decides equipment, software, and curriculum, are crucial. Maximizing the potential of the classroom and the course depends on these decisions. Careful weighing of all options is vital because these options are often irreversible. Funds invested in the computer classroom may not be supplemented for several years. Therefore, wise choices enable the school to offer the best program possible, given the restrictions under which choices must be made and the limited resources available.

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