Teaching Methods

Using Database Management Software to Enhance Learning in Plant Materials Courses

Robert W. Boufford

Additional index words. computers, computer literacy, herbaceous, identification, landscape, plant materials

Summary. With the increasing use of computers in the horticulture industry, advisory committees are recommending computer literacy training. Database management software is a tool students can use to enhance the learning of plants and obtain hands-on experience with computers. Students in an herbaceous plant materials course develop a plant database and create a companion flash card set from printed database records and pictures. Benefits of the project are: Improved memorization of plant information, enhanced information research skills, and use of a tool in later design activities. Other horticulturally related courses, including woody plant materials and pest management, can use the activities to achieve similar benefits.

Horticulture Industries Division, The Ohio State University Agricultural Technical Institute, 1328 Dover Road, Wooster, OH 44691.

Any person pursuing a career in ornamental horticulture must have a working knowledge of plants used in the landscape (Georgia State Dept. of Tech & Adult Ed., 1990a, 1990b; New Jersey State Dept. of Ed., 1985). However, plant materials courses are often among the more-difficult courses for many students. At OSU/ATI, research of student performance for a Title III proposal identified the plant materials course as having large numbers of students performing below acceptable levels. This course has a high level of failure (>20% of students enrolled) or poor performance (>40% earning less than C grades) (1992 Title III Proposal).

In plant materials courses, students must know 100 to 200 plants commonly used in landscape situations. Along with being able to identify visually the plants, and correctly spell and pronounce all names, the student must be able to select and use plants for a specific design situation. One also must understand basic cultural requirements of select plant groups.

Students can use various methods of learning the required information, including slide sets, plant walks with the instructor, specimens in a study lab, and peer study groups. A leaf collection is a very common project in woody plants courses. For an herbaceous plants course, it is often a flash-card collection of pictures from catalogs.

As with many other industries, the computer is a valuable tool in daily horticultural business operations (Gunter and Turner, 1993, Neal et al., 1991). Many advisory boards now recommend a computer literacy course be taken by horticulture students (Neal et al., 1991). However, a major problem with many computer literacy courses, and a complaint by many students, is the lack of application to horticulture. As with writing-across-the-curriculum, which brings applied writing into horticulture courses (Berghage and Lownds, 1991; Zimmerman, 1991), there is a need for computing-across-the-curriculum activities in horticulture courses.

Database management system (DBMS) software is an efficient tool for organizing information on plants used in landscape situations. A major advantage of using DBMS software is the ability to perform rapid searches on very large files of plant information, as opposed to paging through countless catalogs, books, and other types of literature.

There are many plant databases in existence, including large visual libraries on video laser disc (Schafer, 1993, Urbano, 1986, White, 1992). Proper use of these plant databases helps a student learn to select plants based on appropriate site and design criteria instead of selecting plants based on pictures in a catalog.

These materials are more useful during later design activities, in which they serve as electronic versions of paper reference books, allowing for a more rapid finding of plant information. In a plant materials course it is important to have students become actively involved in creating the plant database and, hopefully, improving their knowledge of plants for later use in design courses and activities.

In plant materials courses at OSU/ATI, students use DBMS software as an additional learning tool, along with more traditional learning activities. Students also experience an applied horticultural computing activity and develop a reference tool for use in later design and management classes.

Herbaceous plants class project

For a class project in an herbaceous plants course, students use DBMS software, index cards, and picture materials to develop plant information files and "flash card" sets. The course is quarter class covering identification and uses of herbaceous plants in the garden and landscape. OSU/ATI traditionally offers the course in spring and summer quarters, with the addition of winter quarter starting in

1992. Beginning in 1991, I have assigned the project to both the summer quarter and winter quarter classes that I teach. The instructor of the spring quarter class assigns the flash card portion of the project with optional use of the software.

The objectives of the project as presented to the students are to:

1) Provide students with an additional means of learning herbaceous plant information.

2) Provide students with a means of organizing and displaying plant information.

3) Introduce students to a use of computer technology in landscape management.

4) Provide students with a plant information file system for later use in their careers.

Students are presented six lists, one list per week. Each list consists of about 25 herbaceous plants with three of the lists covering perennials, two covering annuals, and one covering monocots. For each plant list students select and enter an assigned number of plants from each list into a database. Along with the technical name, common name, and family name, students enter additional characteristic and cultural information in several predefined fields for each plant record. To expand their knowledge of plant materials, they also enter a separate detailed record of an additional cultivar or related species for each selected plant.

After entering records into the computer database, students print a paper copy of the records, separate the records, and individually paste each record to an index card along with a picture from an old seed catalog affixed to the backside of the card. At preassigned times, the plant cards are collected along with the database file for evaluation. Along with evaluation, the individual student database files are merged into a large comprehensive class database file for use in later design activities.

A variation of the project for the summer quarter class is to allow photographs taken by the students in place of catalog pictures. With single-use cameras that contain pre-loaded film, a student is able to develop an extensive photograph collection at minimal cost. As an additional variation to the assignment, students may be allowed to paste both the printed record and the picture or photograph on a single sheet to create pages in a reference book (Fig. 1).

Anticipated benefits

The process of typing plant names into a database helps to reinforce the


```
Coreopsis lanceolata                          FAMILY: Compositae
Tickseed                                       ID CODE: CRPLN
             CLASS: Herbaceous Orn.      BLOOM LENGTH: 4-6 Weeks
              TYPE: Perennial             FLOWER SIZE: 2 to 2.5 inches
   MATURE HEIGHT: 1.5 feet             LIFE EXPECTANCY: No Choice
   MATURE SPREAD: 1 foot               HARDINESS ZONE: #4/-30 to -20 F
      PLANT FORM: Clump                     SOIL TYPE: Clay
          DENSITY: Open                 SOIL MOISTURE: Moist & Drained
          TEXTURE: Medium                     SOIL PH: Mild Acid (6.5)
   FOLIAGE COLOR: Medium Green            LIGHT LEVEL: Full Sun
      FLOWER FORM: Disk                   GROWTH RATE: Medium
     FLOWER COLOR: Yellow              FERTILIZER NEED: Low
       BLOOM TIME: May-June             PEST PROBLEMS: Occasional
   USE: Borders           USE: Cut Flowers           USE: Wild Flowers
   NOTES: flat fruits are small, dry and look like bugs plant is related to
   NOTES: the sunflower flowers of this plant resemble a daisy
   NOTES:
   NOTES:
```


Fig. 1. *Printed record and photograph mounted on a single sheet for placement in a "reference manual."*

memorization process, similar to the traditional method of drilling through repeated writing of words or names. In addition, students enhance their research skills while gathering data for each of the plants, as they often need to use various library materials, including other books and journals. This research process also enhances critical thinking skills as students need to develop search strategies in locating the information on each plant.

Students used their flash cards in the traditional manner of studying through observation and recall. With the enhanced printed data record, students also can use the cards as a study tool for plant attribute exams.

Students taking photographs for their flash cards instead of using catalog pictures obtain an unanticipated benefit. In the process of composing and framing the plant for the photograph, the students need to observe the plant from several different views to select the best display. This composing process enhances learning as they observe multiple views of the plant instead of one or two static views of a slide or textbook drawing.

Along with the flash cards, students can use the search capabilities found in database management software for study purposes. Students can set up queries to find plants based on certain characteristics. Just before execution of the query, they determine which plants the query will extract from the database. Even though this study method was demonstrated to the students, I did not observe or receive comments from students using this method.

With the plant database and companion card set or reference album, students have the foundation of a plant materials reference for use in later courses such as landscape design, internships, and for career uses. Several graduates continue to use their data-

bases in their work.

Incorporating the requirement of a plant database brings an applied computing activity into our traditional horticulture courses very similar to the goals of writing-across-the-curriculum to bring "genre-specific" writing into our technical courses. This applied computer activity also serves as a demonstration of an activity that is growing rapidly in the industry and provides hands-on practical training of the activity before a student's entry into a horticulture position.

Project use in related courses

Even though I use the project in an herbaceous plant materials course, other identification-type courses can benefit from similar activities. An activity in woody plants courses is a leaf collection where students include a brief display tag with each leaf. In a manner similar to the flash cards, students use database software to create a more-detailed identification label affixed in proximity to the leaf.

Many pest control courses require some type of specimen collection. In all of these projects, students can use database software for data entry and labeling. With a properly developed database, a student can use the software as an initial pest identification tool through searches and queries of the database.

Conclusion

Unlike most educational software that is of little or no use after a student completes the activity, DBMS software in plant materials courses can serve multiple purposes. As a learning tool, it can help the student organize information on plant materials, enhance memorization through the repetition of typing, enhance skills in researching information, and, when combined with traditional study aids such

as flash cards, serve as a study aid for examinations.

Besides being a learning tool within a course, databases developed during a plant materials course serve as a foundation for students' knowledge of plants that they can take on internship and future jobs. Furthermore, use of DBMS software provides an example of computing in horticulture and provides hands-on experiences likely to be encountered in future jobs.

Literature Cited

Berghage, R.D. and N.K. Lownds. 1991. Using writing in horticultural education. HortTechnology 1(1):124–126.

Georgia State Dept. of Technical and Adult Education. 1990. Environmental horticulture program guide.

Georgia State Dept. of Technical and Adult Education. 1990. Environmental horticulture program standards.

Gunter, L.F. and S.C. Turner. 1993. Computerization of the US ornamental nursery industry. Agribusiness 9(1):77–90.

Neal, S.M., K.D. Hammond and G.M. Kreps. 1991. Future curriculum needs and graduate attributes of agricultural associate degree programs. NACTA J. 35(4):21–23.

New Jersey State Dept. of Education. 1985. A comprehensive horticulture curriculum guide for New Jersey schools.

Schäfer, R. 1993. The computer connection. American Nurseryman 178(1):69–87.

Urbano, C.C. 1986. Laser videodiscs bring the power of pictures into the garden center. Amer. Nurseryman 164(5):69–73.

White, J. 1992. Floppy-disking the garden. Natl. Gardening 15(2):50–54.

Zimmerman, A.P. 1991. Journal writing for technical courses in writing-across-the-curriculum. NACTA J. 35(2):24–29.