EDUCATION POLICY COMMITTEE

Report on Computing Proficiency at the College of William and Mary

January 30, 2001

Computing in all its many variants is a fact of life in 2001. This is especially true at the College. The WEB, Internet communication, digital analysis, and digital imaging are as much a part of how we access information and analyze it as libraries were before the 1990s. Most of our undergraduates come to William and Mary with skills that surpass those of many faculty. Sophisticated WEB searching, WEB page design, and computer-assisted design (CAD) are basic applications that our students use. Acknowledging the pervasive presence of digital information in academics, the Educational Policy Committee conducted a review of the Concentration Computing Proficiency.

As a means of bringing our curriculum in line with the challenges of the last decade, the Faculty of Arts and Sciences incorporated a concentration computing proficiency in 1993 which was implemented across departments and programs by about 1997. The Undergraduate Curriculum (1993) states:

> Computing: Students must satisfy a Concentration Computing Requirement established by each department, program, or school and approved by the Education Policy Committee. The purpose of the requirement is to ensure that all students have mastered the advanced computing skills appropriate to their respective disciplines. Students will be required to demonstrate proficiency in:
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> a. computer programming or,
> b. the computer-aided composition of original, creative material (including mathematical or simulation models, music or other works of art, or significant experimental studies), or,
> c. the use of a computer to retrieve, process, and analyze numeric or non-numeric information.
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> Concentrations may designate certain departmental courses and/or courses in other departments (such as Computer Science) as satisfying this requirement. (P.9)
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> Departments and programs in Arts and Sciences have resorted to various ways of accomplishing the goals of this requirement. The following is the current concentration computing proficiency for each department or program.

Area I

Art and Art History – ART 418: Advanced Architecture (CAD)— available only to architecture students or CSCI 131

Classical Studies – 300 or 400 level course that is also used for Concentration Writing Requirement

English – ENG 475: Concentration Seminar or a course approved by the department (substantive research using computing resources and techniques)

Modern Languages and Literatures – MLL 250: Impact of New Technology on Modern Languages

Music – MUS 310: Problems and Methods in Music History

Philosophy – two 400 level courses for which one paper is completed in each using word processing

Religion – One of the following: REL 305, 322, 331, 332, 334, 339, 340, 341, 345, 346, 355, 358, 411, 414, or 495/496

Theatre, Speech and Dance – THEA 306: Stagecraft, 309: Costume design, 314: Lighting design, 320: Theatre administration or CSCI 131

Area II

Anthropology – ANTH 301 & 302 (Methods courses – computers used for word processing, data management and fieldwork)

Economics – ECON 307: Statistics

Government – GOV 201L: Computing proficiency lab, 301: Research methods or 307: Polling and survey analysis (students must be able to demonstrate the ability to use computers for word processing, searches and data analysis)

History – HIST 390: Historians and computers, 423: America's Gilded Age (Just approved by EPC) or CSCI 131, 141 or a more advanced CSCI course

Kinesiology – KIN 308: Bio-mechanics or 394: Statistics and evaluation

Psychology – PSY 301: Statistics

Sociology – SOC 401: Statistics or equivalent

Area III

Biology – BIO 200: Biological Sciences Lab

Chemistry – CHEM 391 & 392: Physical Chemistry Lab (recently revised to be incorporated into concentration)

Computer Science – CSCI 141: Intro to computer science or 241: Data structures

Geology – GEO 406: Senior research or 496: Honors

Mathematics – CSCI 141

Physics – incorporated into the concentration

Interdisciplinary Studies

American Studies – AMST 370: Concentration Seminar

Biological Psychology – BIO 200

Black Studies – must be approved by advisory committee

Environmental Studies – INTR 460: Seminar in environmental studies

Interdisciplinary Studies - approval of the committee

International Studies – appropriate courses in a student's area or CSCI 131

Linguistics – must be approved by the committee

Literary and Cultural Studies – LCST 301: Theoretical approaches to literary and cultural studies

Medieval and Renaissance Studies – meet the computing requirement in any participating department

Public Policy – fulfill the Economics or Sociology computing requirement

Women's Studies – fulfill computing requirement in any participating department

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The EPC finds that almost all departments and programs have met the 1993 requirement in good faith. When compared to our peer institutions and the University of Virginia, it is clear that William and Mary was ahead of the game, as very few have a specific requirement. (See Appendix A) But there is a concern that there may be areas where we are trapped in a time warp—that the requirement has not kept up with either the skills most of our undergraduates bring to William and Mary nor with the challenges of this decade. Because of the omnipresence of the computer, our students should ideally experience Digital-Information Literacy (DIL) throughout the curriculum. The EPC believes that in fact this is the case generally. It is time to restate the goals and objectives of the requirement to meet current and future needs.

The EPC finds that there is another concern with the concentration computing proficiency (CCR). As it is conceived, the CCR does not lend itself well to standard goals and objectives across disciplines or even within disciplines. This is especially true when we compare assessment results with the concentration writing requirement (CWR). For the latter, there is a direct connection between the objectives of the freshman and the upper-level writing requirements. The use of DIL is not consistent in lower-division courses. (Appendix B) Moreover, writing has fairly standard goals and objectives and fairly standard assessment tools, while the CCR does not. The EPC agrees with the Office of Assessment that Arts and Sciences should establish an effective means of assessing digital information literacy.

Institutions that were not as forwarding looking as William and Mary entered the arena of technology assessment after the advent of the WEB. Rather than developing specific, discipline courses, many institutions have created on-line tutorials for new students. These provide a base-line assessment of student skills and knowledge of digital information. Most emphasize information literacy, following the guidelines of the Southern Association of Colleges and Schools (SACS, section 5.1.2). Some examples are found at the following URLs:

James Madison University - "Go for the Gold"
http://library.jmu.edu/library/gold/modules.htm
A basic "library tutorial".

Texas Information Literacy Tutorial (TILT)
http://tilt.lib.utsystem.edu/
Well done but primarily about the Internet.

University of Wisconsin Parkside Library
http://www.uwp.edu/library/
Well done, with good modules including information on such topics as "authority" and "plagiarism."

The advantage of tutorials like these is that they can include many modules to assess the areas of digital information literacy that the faculty of Arts and Sciences judges to be important—not only those commonly called Information Literacy.

Why the term "Digital Information Literacy"? As the EPC envisions a new approach, a more inclusive term for expectations and skills is needed. Digital information encompasses everything from the conversion of analog data to the synthesis or creation of ideas using data processing. As a starting point, the EPC defines digital information literacy as a general understanding of and competence in three integrally related processes:

- knowledge generation: an understanding of how knowledge is created and organized
- knowledge access: an understanding of knowledge communication processes
- knowledge evaluation and integration: an ability to evaluate, synthesize and incorporate in written, oral and media presentations

The EPC understands that different concentrations require varying amounts of experience or expertise with digital processing. The sciences, for example, demand an understanding of computer technology at all levels that exceed the needs of students in the humanities that rely on a thorough knowledge of information access and evaluation of digital information. The EPC believes that by ensuring that all students start from the same bar, individual concentration requirements can be implemented and kept current more easily.

Within the three processes outlined above, modules can be developed that assess the understanding and skills our students bring to William and Mary. These are in no way intended to be final.

An Outline of Possible Modules

For a Web-based Tutorial and Examination on

Digital Information Proficiency

1. Introduction to the world of Digital Information
    A. What "computers" do
    B. How data are stored and organized
    C. How information is retrieved and presented

2. Analyzing your research needs.
    A. Define the research topic
    B. Determine the information requirements for the research question
    C. What sources to use
3. Finding Information
    A. Using library resources
        i. Digital resources
        ii. Non-digital resources
    B. Special Resources
        i. Other databases
        ii. Data sets and statistical resources
    C. Web Searching
        i. Search engines
        ii. Web Research Strategies
        iii. Citing Web Sources
4. Communicating with the world
    A. E-mail
    B. Web Publishing
5. Evaluating information quality
    A. Print Material
    B. Web Sites/ Avoiding bad sites
    C. Mass Media

    D. Looking for Bias

6. Information Ethics: Citing Sources and Fair Use
7. Discipline/Concentration Specific Information

What are the advantages to restructuring the computing proficiency?

- A baseline of skills and understanding, which will be the same for all students,

  is established at the start of a student's career

- Emphasis on ethics, the illegality of plagiarism, and the evaluation of digital information is stressed at the start
- At regular, short intervals, about every 2 years, the modules will be updated to keep abreast with incoming students' skills and the demands of technology and digital information
- Adjustment of the freshman assessment modules will permit frequent integration of more sophisticated applications in upper-division courses

The EPC would like to propose something along the following lines. Incoming freshmen will take a digital information literacy test during orientation weekend or during the summer. This immediately assesses their skills and basic understanding of selected applications and evaluative tools for using digital information. For the areas where a student is deficient, workshops or on-line tutorials will be required. Successful completion of all modules is recorded and monitored by a faculty/administrative office.

While it may appear that this will require large amounts of human and financial resources, it is the opinion of the EPC that this can be reduced by incorporating the already existing Information Literacy course and its on-line materials. Connie McCarthy, Dean of the University Libraries, has already expressed a willingness to assist in this. An additional FTE position may be required. If Project ARIA does not get in the way, the EPC believes that this program can be implemented by Fall 2002.

APPENDIX A

Peer Institutions*

Boston College No specific requirement in the College of Arts & Sciences. Only in the School of Management—Management Core is there a requirement for 'computers'.

Boston University No specific requirement; students may enroll in computer science courses to satisfy the Natural Science/Math/ Computer Science core.

Brown University No requirements.

Dartmouth College One course in 'Technology or Applied Science' as part of n general education requirements.

Duke University "Science, Technology and Society" is one of 3 areas of Focused Inquiry. DIL does not appear as one of the three Competencies: foreign language, writing, research.

Emory University One course in mathematics or computer science as a general education requirement.

Georgetown University Two courses in Mathematics or Science.

SUNY-Albany **Project Renaissance:** a residential learning experience with a community action learning project. Also has an instruction based computer literacy component.

SUNY-Binghampton Within the freshman writing requirement there is an information literacy component. There is a highly selective Honor's Project for 100 third and fourth year students that incorporates DIL components.

Tulane University No specific requirement

UC-Riverside No requirement

Univ. Connecticut Two courses in Science and Technology as a general education requirement. General Education Task Force Report of Nov. 2000, recommends a directed program in Information Literacy

University of Delaware The Institute for Transforming Undergraduate Education states that "undegraduate courses should apply technology effectively where it will enhance learning." The Institute provides faculty development opportunities to carry this out.

Univ. of New Hampshire No requirement

UNC-Chapel Hill Computer Science as one option in the Mathematical Sciences core.

Univ. of Notre-Dame The Student Training Program is a series of hands-on, instructor-led computer skills courses. No specific requirement.

Univ. Tenn. Knoxville No specific requirement.

Vanderbilt University Some English and Women's Studies courses carrying "W" designation use the Daedalus Integrated Writing Environment (DIWE) to enhance the teaching of writing.

Wake Forest University Final Report of Undergraduate Curriculum Review Committee (1998), citing that "the university prides itself on introducing students to technology," recommended that every student take a course in quantitative reasoning.

University of Virginia No requirement

* material found on university WEB sites

APPENDIX B

The Computing Proficiency Subcommittee informally polled 28 departments/programs asking them to identify the courses that satisfy a GER without pre-requisites. In particular, we asked them to tell us what computer applications the students are required to use. These applications may include (but are not necessarily limited to) software packages, CD and web-based databases, web pages, etc.

Fifteen of the departments/programs responded. The following applications were identified:

CourseInfo - 7 departments - representing all three areas

The Web (e.g., searches and consulting particular sites) - 8 departments (mostly Areas 1 and 3)

Databases - 3 departments (one in each area)

Statistics - 2 departments (Areas 2 and 3)

CD-ROM - 1 department (Area 3)

E-Reserve - 2 departments (Area 1)

PowerPoint - 1 department (Area 2)

Word processing - 2 departments (Area 1)

Specialized Software - 2 departments (Areas 1 and 3)

It should be noted that many more departments incorporate various applications in their basic GER courses, although these are not requirements. For instance, many noted that CD-ROMs now accompany textbooks and though not required to, most students do make use of them. In addition, although not required to do so, most, if not all, students write required papers using some sort of word processing package.

It should also be noted that many of the GER courses reported do have one or two pre-requisites, which also incorporate DIL components.