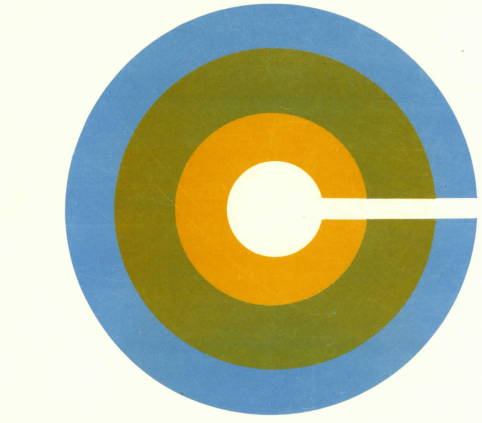
REPORT
on the
PROGRAM REVIEW
of the
ELECTRONICS PROGRAM



Cariboo College

REPORT
on the
PROGRAM REVIEW
of the
ELECTRONICS PROGRAM

PROGRAM REVIEW OFFICE

November, 1987

SUMMARY

The Electronics Department realizes that, in order to remain educationally viable, the program it offers must stay abreast of the needs of a rapidly changing Electronics field. To do this, the most urgent task is revising the curriculum, but other problems that must be dealt with are an inactive Advisory Committee, inadequate block professional development time under the current Collective Agreement, and the ravages of restraint upon equipment replacement. Corrective action of considerable magnitude is required, but once these changes are in place, the Electronics Program will be better prepared to satisfy the steady demand for its graduates that should continue into the 1990's.

TABLE OF CONTENTS

THE PROGRAM EVALUATION COMMITTEE

(October 30, 31, 1986)

PROGRAM RESOURCE PERSONS	**Alan Green** then Chairperson, Electronics
	Jean-Serges Bourget Instructor, Electronics
PROGRAM REVIEW CO-ORDINATOR AND COMMITTEE CHAIRPERSON	**Rod Michell** then Co-ordinator, Program Review
EXTERNAL REPRESENTATIVE	**Jerome Schatten** Department Head, Electronics Vancouver Vocational Institute
THIRD PARTY REPRESENTATIVE	**Gene Turney** Chairperson, Computer Aided Drafting and Design Technology

INTRODUCTION

The Program Review process was undertaken for the Electronics Program over the period December, 1985, through April, 1986. The Program Evaluation Committee met to sift and deliberate the data on October 30 and 31, 1986; these meetings produced three sets of notes, made by committee members. This document is based substantially on the impressions and perceptions of the Electronics Program Evaluation Committee (PEC), expanded into the form of a report by the Program Review Co-ordinator. While the data gathered apply to the period 1983 to 1986, and while some of the concerns identified in that period have already been addressed by the Electronics Department, nonetheless much of the data is still valid in that it points to areas where action is still required.

BACKGROUND

The Electronics Program at Cariboo College began in September, 1972, as a ten month program, with a focus on Telecommunications (TCOM). In 1974, the Electronics Advisory Committee and the employers expressed concerns about the program, which led to its re-organization so that the first half was common core, while the second half offered a speciality option in either Telecommunications (TCOM) or Home Entertainment Products Servicing (HEPS). In 1979, the Electronics Business Machines (EBUM) option was added, and in 1980, the program moved to a twelve month format, underlining its constantly evolutionary nature. The HEPS option was terminated in August, 1981.

With the upsurge in computer technology, Electronic Business Machines (EBUM) evolved into the Computer Maintenance Technician (CTEC) option (1982). The newest program option, Computer Automated System Technician (CAST), otherwise known as Robotics, came on line in September, 1985.

Currently, Electronics is a twelve month program offering a common core curriculum followed by a choice of three options:

Telecommunications Technician (TCOM)

Computer Maintenance Technician (CTEC)

Computer Automated System Technician (CAST).

Present Electronics faculty have 39 years' aggregate instructional experience, ranging from 15 years to 2 years per instructor.

METHODOLOGY

A wide variety of methods and materials was used to conduct the review process.

Standardized questionnaires for program review were sent to the Electronics Program Advisory Committee members, to employers, to faculty, to program graduates, and to current students (first and second quarters).

Ben Eldridge, Vocational Director, provided historical and descriptive data on the program.

Individual and group meetings were held with:

Don Graham, Chairperson, Electronics (September, 1987)

Alan Green, Instructor, Electronics

The Electronics Department provided a variety of materials to support the review process. These materials included

CTEC Course Objectives, 1986-87 (Sept. 1986)

CTEC Lab. Manual, 1986-87

TCOM Course Objectives

TCOM Lab. Manuals

CAST Course Objectives

CAST Lab. Manuals

Electronics 153 Lab. Manual

Digital Integrated Circuits: User's Notes and Lab. Manual

Electronics 152 Lesson Plans and Exam Schedule

Electronics 162 Lesson Plans

Electronics 163 Lab Plans

Linear Integrated Circuits: User's Notes and Lab. Manual

Electronics Department Proposals, Position Papers and Correspondence (February - December, 1985)

In addition, J.S. Bourget, Instructor in Electronics, delivered a report addressing concerns and general feelings about the Electronics Program.

Based on these materials and discussions, a report adhering to the Program Review guidelines was developed. The following pages detail the findings.

DISCUSSION

Much of the data assembled from former student questionnaires was found to be of little use in that

a) the low percentage of responses did not constitute a statistically significant sample;

b) many of the responses that were returned evaluated the phased-out EBUM and HEPS options, not the current CAST, CTEC and TCOM specialities, and thus were of historical interest only. (HEPS and EBUM responses are summarized separately in Appendix I as they have little bearing on the current program.)

More useful were the responses gleaned from the Electronics Advisory Committee, which had a 67% return, the employers, with a 36% return, the Electronics Faculty, with a 100% return, and the Current Student responses (likewise 100% return).

The following trends were detectable in the questionnaire responses:

Advisory Committee

- The advisory committee perceived itself as not fulfilling its roles and responsibilities in monitoring the program on an ongoing basis; it had not, at the time of the survey, met for some time.

- It felt that the program objectives were not validated by industry, nor was the program responsive to trends in the field.

- Funding was perceived as a problem.

- Graduates were not perceived as being particularly well prepared for work in industry (by contrast, see some of the former student responses and employer responses).

Employers

- In general, employers are satisfied with the technical background of graduates and their ability to assume increasing responsibility.

- Employers indicated that communication skills of students could be improved.

Faculty

- Program structure and sequence of units should be revised.
- Program objectives were seen to be in need of revision.
- Provision for instruction in oral and communication skills was noted as absent (see also students and employers responses).
- A lack of articulation between the program and the job market was noted.
- Curriculum development resources (money, p.d., design expertise) were urgently needed.
- Ongoing communication between program personnel and administrators, and among program personnel themselves was seen as lacking.
- Liaison with industry could be better.
- The Advisory Committee was not seen as performing its roles and responsibilities.
- Insufficient staffing was perceived as a problem.
- Funding was a problem (perennially).
- Facilities, equipment and supplies needed attention.

Former Student Survey (graduates and non-graduates)

TCOM

- Students were generally satisfied with the program, particularly the relevance of individual courses to the total program as well as the methods of instruction (e.g. individual learning activities, lectures, labs).
- Oral and written communications are necessary in most related jobs but there are no such courses in the Electronics Program.
- Students felt they should have been given more assistance in finding employment.

CTEC

- Students were generally satisfied with the program, particularly the facilities for instruction and the relevance of individual courses to the total program.

- Students expressed a desire for communications courses (as in TCOM).

- Students were not satisfied with the career information given to them by Cariboo College personnel and would have liked more assistance in finding jobs.

- Students would have liked more hands-on, job-related lab. time.

Current Student Survey

- Generally, Electronics instructors are considered excellent, with a few reservations about individual instructor attitudes to students.

- Students feel that because of large class size instructors are not always available to students in the lab. or for extra assistance.

- Poor course structure - instructors need to do more planning and preparation.

- Students indicate that they feel there should be some stronger course prerequisites or testing.

- Pace is too fast - not enough time allowed to learn the material.

- Shortage of lab. equipment.

SUMMARY OF QUESTIONNAIRE DATA

(Electronics Program)

The categories and quantities of responses are tabled below:

Recipient	# Sent	# Completed and # Returned	% Return
Advisory Committee	6	4	67%
Employers	22	8	36%
Faculty	6	6	100%
Students: Former	256	49	19%
Current	48	48	100%
Total	338	115	34.08%
Former Students by Program Option			
CTEC	67	12	18%
EBUM	27	5	18%
HEPS	38	5	13%
TCOM	124	27	22%

ADMISSIONS DATA

Currently, the program capacity is 72, with 18 being admitted to each program option; specialization in the various options is dependent on passing the first two quarters. Each option is offered once in a twelve month period, with one being offered twice. (For example, in 1986-87, CAST had intakes in September and April).

Admission interest normally runs beyond the number of seats in the program: for every intake of 18, there is a minimum of three on the waiting list and six on the upgrading list (upgrading their qualifications to meet program requirements). Thus even a conservative estimate indicates that demand exceeds capacity by a minimum of 16% per intake, with a further 33% of unaccepted applicants engaging in upgrading activities.

The program has always been filled to capacity: C.E.I.C. purchases about 50% of the seats per intake, and "tops up" the program intake from the waiting list if there are any vacancies at program commencement.

One feature to emerge from the admissions data was the ratio of males to females in the program: 50:1 over the period under review. This figure indicates that efforts must be made to make the program and the career of Electronics more attractive to females.

The attrition rate is approximately 22.5% (four students per intake), which is not excessive. The usual reasons cited for withdrawal or failure are lack of money, poor academic preparation, personal problems, inappropriate career choice, and lack of motivation.

Student comments about instructor attitudes, insufficient lab. time, inadequate attention for weaker students, and poorly planned curriculum may indicate weaknesses in the general quality of the program rather than specific causes of attrition.

PLACEMENT DATA

Responses to the placement questions on the former student questionnaires were so inconclusive as to be of little help in determining whether the program prepares a viable market commodity. Although little is done formally by the College in the way of job-finding and placement, an informal network exists between faculty and employers, and faculty sources indicate that 90% of program graduates are being employed, most of them in training-related jobs.

Program graduates are suitable for employment anywhere in the Electronics field - from technicians to salespersons to managerial and self-employed roles. Most graduates from the program who secure full-time, training-related employment can expect to earn salaries starting at about $1,600 per month for TCOM and $1,460 to $1,500 per month for CTEC.

STRENGTHS OF THE PROGRAM

The Program Evaluation Committee identified the following areas as strengths of the Electronics Program:

1. Cariboo College Electronics Program is distinctive from others in the Province: Northwest and Selkirk have general, nine-month programs; and while B.C.I.T., V.V.I and Camosun have programs of similar length, they have not developed an option system like Cariboo's. Such is the program's reputation that it attracts students not only Province-wide, but from outside the Province.

2. The Electronics Program at Cariboo College is cost-efficient; its $3.30 per Student Contact Hour compares favourably with the system mean of $4.87 per SCH, as does its $19.81 per Registered Training Day as opposed to the system mean of $19.97 per R.T. Day (1985/86 PACS Report, p.74).

3. Demand for the program is likely to continue steady. Electronics is a Federally designated critical skill; Job Futures: An Occupational Outlook to 1992 (1986-87 edition) projects an average growth rate of 2% per annum or 15.5% to 1992 in general electronics.

4. Generally, the quality of graduates entering the job market is perceived as being good; graduates are considered to be technically prepared for the workplace.

5. At all stages and in all options of the program, the balance between theory and practicum is considered appropriate.

6. With some reservations (see previous page), faculty are perceived to be good to excellent; their responsiveness to student needs and provision of individual help were particularly noted.

7. Faculty show versatility in finding equipment resources for the benefit of the students, usually through donations or minimal cost acquisitions. These defray the program's capital expenses. It should be understood, however, that faculty efforts in this area should not negate the need for regular capital expenditures.

8. Faculty are aware that their program is in need of remodelling, and have shown innovativeness and initiative over the past few years (see, in particular, departmental correspondence for 1985). The desire for change is there.

AREAS WHICH CAN BE IMPROVED

This section highlights areas of the Electronics Program which the data suggest can be improved.

1. **Advisory Committee**

The Electronics Program Advisory Committee has not met on a regular basis for sometime prior to its being surveyed. Without regular articulation between its members and faculty, the program cannot hope to adjust to the advances of electronics technology.

2. **Curriculum:**

The curriculum is currently suffering from the cumulative effects of insufficient planning over the last few years. As the electronics field expanded exponentially in the early 1980's, curriculum initiatives were often made in a limited time-frame in an attempt to keep abreast of changes in industry. The result is that the program, while still functional, is showing signs of disarray:

its curriculum and learning activities do not always mesh with its objectives;

its modules do not dovetail as well as they should;

back-up materials (e.g. lab. manuals) appear to be in need of revision and refinement;

there is some question as to the appropriateness of the length of the program in relation the curriculum;

instruction in communication skills is perceived as currently lacking;

calendar entries do not reflect clearly the nature of the program and the sequence of courses.

In short, the structure and content of the whole program, from objectives down to learning activities and mode and frequency of student assessment, are in need of a thorough revision.

3. **Faculty Expertise and Professional Development**

Although generally perceived as doing a good job, faculty see themselves as lacking in expertise in some areas of the curriculum. A "flying by the seat of one's pants" attitude has come to prevail in the

department. Because of lack of block preparation time, instructors are forced to plug the gaps in their knowledge on the job as opposed to engaging in extensive preparatory study and course planning in their specific areas. This state of affairs is intensified by the twelve-month duration of the program and the maximization of faculty resources during this period (vocational faculty work a 45 week year), which leaves no time for block professional development; the one hour per day p.d. allocated under the current contract is next to useless, as it prohibits extended preparation. Prolonging the current dispensation will merely compound the imperfections in instructor preparedness and widen the gaps in their knowledge.

4. **Follow-up and Industrial Interface:**

A salient gap in the program profile is linkage between faculty and industry in two respects:

faculty renewal through liaison with and extended immersion in the workplace;

student placement and follow-up.

The first would allow the faculty to remain current in their knowledge and expertise; the second would develop as a consequence of the first, and would improve post-graduate data on program completers.

5. **Equipment and Budget**

Every capital-intensive department suffered during the 1982-87 restraint period, and so the "freeze" on equipment purchases is by no means restricted to the Electronics Department. However, such increases in the capital and operating budgets that did occur in the time-frame under review were allocated to the CAST option; the two other program-options, CTEC and TCOM have been starved of equipment replacement for some five years. In the CTEC option, the shortage of hardware, particularly IBM compatible micros for maintenance and repair simulation, impedes the quality of instruction, and students in the TCOM option, which has had no systematic re-equipping since 1981, have to work with obsolete equipment. In some instances, equipment such as oscilloscopes is over 14 years old.

6. **Facilities**

There is a shortage of storage and lab space in the Electronics/Electrical area.

RECOMMENDATIONS

The following recommendations emerged from the PEC's discussions:

1. The Cariboo College Electronics Program Advisory Committee should immediately be reconstituted and revitalized by the appointment of fresh blood; it should resume its mandate to provide direction and advice to the Electronics Program; it should meet a minimum of twice per year; formal minutes should be taken of its proceedings and recommendations and forwarded to the appropriate authority. It is the responsibility of the Divisional Director and the Departmental Chairperson to arrange the meetings and set the agenda.

2. The first task of the reconstituted Advisory Committee, in conjunction with the Electronics faculty, should be, to reformulate and validate the goals and objectives of the Electronics Program, and to ensure that they mesh with the revised Cariboo College Mission and Goal Statement, with Vocational Division goals and objectives, and with industrial imperatives.

3. The Electronics Department should reconstruct, from the ground up, a curriculum appropriate to the program's goals and objectives. The following points should be borne in mind during the reconstruction process:

   a. an appropriate balance should be maintained between theory and practicum;

   b. content and learning activities should be developed in accordance with objectives;

   c. instructional units should be modularized for better sequencing;

   d. lab. manuals should be revised and refined;

   e. the frequency and mode of student assessment should be determined by the modular units;

   f. calendar entries and other publications should be revised to reflect more clearly the nature of the program.

The following recommendations, though not exactly curricular, should be considered prior to the curriculum revision process as they may have a bearing on or be predicated by curriculum decisions:

g. The possibility of altering the length of the program should be considered. The current twelve-month, non-stop program is too hurried, and might be broken into a four semester program (eight months per year over two years) or a six quarter system (eighteen consecutive months broken into six three-month periods). Intakes could be staggered to accommodate either of these proposed patterns. C.E.I.C. would have to be consulted.

h. Some attention should be given to broadening the base of the Electronics curriculum by including general education. The Electronics Department might consider in its curriculum deliberations the model of the Welding Technologist Program (now defunct), which integrated courses in Physics, Mathematics and English with technical training.

i. As curriculum revision is not to be undertaken lightly, it is strongly recommended that administration release one or two Electronics faculty for a minimum six month period to initiate curriculum and lab. manual revision. For both projects, faculty should be totally free of instructional duties.

j. The Electronics Department, via the Divisional Director, should consider approaching the Division of Distance Education and Instructional Design to access assistance in its curriculum revision from the Curriculum Development unit.

4. The administration should implement a faculty renewal program in the Electronics Department which may encompass some or all of the following features:

a. short-term "experience leave", as at B.C.I.T., whereby faculty members are released to work in industry, or alternatively to observe technological advances; these may be assisted or unassisted leaves, and should be of three-four months' duration;

b. short-term faculty release, as in Recommendation 3i above, for curriculum writing;

c. attendance at Instructional Skills Workshops for those faculty with perceived attitudinal problems;

d. regular performance evaluation of the non-instructional staff.

5. Program personnel and the Divisional Director should make strenuous efforts to engage in student follow-up at six-month and one--two year intervals. The Ministry of Advanced Education and Job Training Student Outcomes software package, on-line at Cariboo College in January, 1988, will help the Electronics Department to access follow-up data. The Program Review office will be glad to provide assistance.

6. It is recommended that the Electronics Department develop a mid-range capital acquisitions plan (say three--five years) with a view to replacing systematically outmoded equipment and augmenting existing items.

7. It is further recommended that the Electronics Department and the Divisional Director continue their efforts to solicit charitable donations of equipment from industry, as the Ministry and the College cannot be expected by themselves to wholly satisfy equipment "wish-lists", or even, in the best of times "reasonable requests" for replacement or expansion items.

8. The Division should develop a plan to remedy the shortage of storage and lab. space in the Electronics/Electrical area.

9. The Electronics Department and the Divisional Director should strive to promote the Electronics Program and careers in Electronics as not just a male-dominated domain, but an attractive alternative to females. Collaboration with the Counselling Department may help in such promotion.

APPENDIX I

Former Student Survey (graduates and non-graduates)

HEPS

- Balance between theory and practice good.
- The relevance of courses to the total program is good.
- Instruction in program courses and service courses is good.
- Individual help provided by instructors is good.
- Remedial assistance services - good.

EBUM

- All of the people surveyed had left college more than five years ago and so did not answer most of the questions.

REPORT ON THE PROGRAM REVIEW OF