Computers in Saskatchewan

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Despite several efforts which originated in the middle 1960s, computers did not make any widespread impact on the instructional mosaic of the province until the advent of locally available independent microcomputer configurations in 1978. These reliable and reasonably powerful devices provided the opportunity for rapid expansion and development of existing programs well as the opening of untried areas.

A case in point is the experience of the Saskatoon Board of Education. The elementary section (a K-8 structure with approximately 15,000 students) started a program of instruction about the computer to a small group of students in 1968. Limited access was obtained to a minicomputer situated at the University of Saskatchewan. Staff inservice was organized, and by 1975, students participated at the Grades 7 and 8 level in 12 schools. During this time the curriculum was formalized, and there was a willingness and a readiness to expand the program. However, it was impossible to expand further without the development of an instructional computing centre with its high initial costs and significant ongoing expenses, because computing resources outside the school system were, and are, almost fully utilized. Through a cost-sharing plan between the local school and the Superintendent's Department, individual schools started to purchase microcomputers in 1978, and other schools were given access to microcomputers on a rotational basis. By the end of the 1980-81 school year, three quarters of the 45 schools in the section owned an APPLE II microcomputer equipped with 48k RAM, a disk drive, and a color TV with many schools owning a printer and a locally designed APPLE Cart. All graduates of Grade 8 in 1981 had completed a 35 hour computer literacy course. (Outlines for this and other computer courses follow this article.)

Developments in the secondary section of the Saskatoon Board of Education paralleled those in the elementary section. By the end of the 1980-81 school year, all of the seven secondary schools had a computer laboratory and offered a 100-hour course in computer science. Four of these schools will pilot a second 100-hour course in 1981-82 (see course outline).

At the provincial level, in the spring of 1979, SaskComp (the provincial computer utility) organized a meeting of interested educators to discuss possible directions. Based on that meeting an ad hoc committee was formed, charged with the responsibility of investigating the area of action proposals. This

group called a meeting of interested educators in January 1980 and the Saskatchewan Association for Computers in Education (SACE) was formed. Based on the recommendations of the ad hoc committee, SACE produced the SACE *Bulletin*, formed various subcommittees to continue investigations, and sponsored a successful fall conference in October 1980. At time of writing, the next SACE conference is scheduled for October 16/17, 1981 at Saskatoon.

The Saskatchewan Department of Education has been following these developments closely and has implemented plans to form curriculum committees to investigate curricula in the areas of computer science, computer literacy, and business education.

The universities in Saskatoon and Regina are developing courses in computers in education. The Saskatchewan Teachers' Federation (STF), in combination with SaskComp, is sponsoring a number of special workshops for teachers. Ten such short courses were offered in August 1981.

In conclusion, educators in Saskatchewan are responding vigorously to the challenge of computers. Computer science, computer literacy, and computers as a component of business education and electronic technology are instructional opportunities available to students in an ever-growing number of centres. Applications such as computer managed/assisted instruction, teacher/administration tasks, guidance, and correspondence-school uses are just beginning.

Course Outline: Computer Literacy
Saskatoon Board of Education

General Information

    (a)   The name of the course is "Computer Literacy."

    (b)   Students enrolled in regular Division III classrooms should take Computer Literacy in Grade 7, Grade 8, or in a combination of the two grade levels.

    (c)   A total of 35 hours of class time is required to adequately present the course.

    (d)   The Computer Literacy program will follow the guidelines as set out by the Superintendent of Schools, Elementary.

    (e)   The principal will have the responsibility for approval of all uses of the computer in his school, in accordance with the guidelines set out by the Superintendent of Schools, Elementary. If uses outside the scope of the Computer Literacy course are considered, the principal will provide the Superintendent of Schools with the details, in writing, of the proposed usage.

Resource Materials

There are a variety of resource materials available. The following books are recommended:

(a)   Core

Computer Literacy, Kindrachuk, McKenzie, Frazer-Harrison, and Shih.
- available through the Textbook Centre
- this is an approved resource book for the teacher dealing specifically with flowcharting and programming in BASIC.

ii) Computer Literacy (Worknotes), Kindrachuk, McKenzie.

- this is approved student material complementing the Computer Literacy text.

(b)   Supplementary

i) BASIC and the Personal Computer (Addison-Wesley)

- this book provides more information on the BASIC language than required by students taking Computer Literacy, but it is a useful reference book for the BASIC used on microcomputers.

ii) Computers and Society (SRA)

- this provides a wealth of information, and discussion is provided on the impact of computers on society.

- it is a college-level book.

Course Content

(a)   Introduction to computing and microcomputers (10 hours)

- history
- present applications (for example, credit-card billing, electronic games, etc.
- applications which cannot be done
- costs
- components
- future applications
- social impact

(b)   Flowcharting (10 hours)

- a logical approach to problem solving
- symbols
- sequencing
- looping
- debugging

(c)   Programming in BASIC (15 hours)

      - operators and order of operations
      - statements

```
        LET
        PRINT
        GOTO
        IF...THEN
        READ..._____DATA...        ⎤
        FOR..._____NEXT...        ⎥─── Optional - as required
        INPUT                       ⎥
        STRINGS                     ⎦
```

      - functions

```
        INTEGER (INT)
        RANDOM (RND)
        SQUARE ROOT
```

      -commands

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        LIST
        NEW
        RUN
        SAVE
        LOAD
```

      - additional commands depending on hardware requirements.

Course Outline – Computer Science 10 and 20
Saskatoon Board of Education

General Statement of Philosophy

    Division IV computer science courses are intended to build on the skills, understanding, and attitudes developed in the Grade 7 and/or 8 computer literacy course.

The aims of Computer Science shall be:

1) to further provide the student with a realistic concept of the power, usefulness, and limitations of the computer;

2) to provide the student with an increased ability to use computers as tools for problem solving and information processing in a variety of circumstances;

3) to provide the student with more information about the effect of computers on society;

4) to provide the student with increased understanding of the historical development of computers, their makeup and operation;

5) to provide the student with a better context from which to consider possible future directions in the use of computing tools;

6) to provide the student with opportunities to work with a structured approach to problem solving using a high-level language (or languages).

The emphasis and order of these aims will vary in each course offering.

Computer Science 10
Prerequisite: Grade 9 Algebra

Topics and Percentage Time Allotments

1. Development and functioning of computer devices   (12%)

    - history
    - computer architecture
        - computer hardware
        - components
        - computer systems
    - languages
        - machine
        - assembler
        - high level
    - "hands-on" experiences
    - care and use of equipment

2. Applications   (32%)

    Use of previously prepared software

    - word processing/text editing
    - transaction-oriented processing
      e.g.- accounting packages
        - statistics packages
        - phone lists
    - utility software
      e.g.- sort/search routines
        - "File Cabinet"
        - "VisiCalc"
    - simulations, tutorials, drill and practice (i.e. CAI)

3. Societal effects: present and future   (10%)

   - technological breakthroughs
     e.g.- space exploration
          - bionic medicine
   - computer services
     e.g.- banking services
          - information retrieval
   - societal problems
     e.g.- privacy and individuality
          - computer crime
   - job opportunities/further training
   - employment directions

4. Problem solving   (*)

   - solution strategies with a structured approach

5. Programming   (*)

   - programming sequence
       - commands
       - syntax
       - documentation
       - debugging
       - hand-written trace
   - programming style
       - top-down design
       - paragraphing/indenting/white space
       - meaningful variable names
       - built-in debugging
       - documentation (programmer's remarks)

   - competencies
       - editing
       - variable manipulation/type
       - input/output commands
       - branching conditional/unconditional
       - computer-defined functions (INT, RND, SQR)
       - loops
       - screen graphics
       - elementary DOS manipulations
       - elementary string operations
       - lists (optional)

6. Consumer evaluation   (6%)

   - exploration of guidelines for the evaluation of products (hardware and/
     or software) and services

* These components will be developed throughout the course; that is, not in
single time-blocks. Their sequence will be repeated in a spiral approach and
take up approximately 40 percent of class time.

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Computer Science 20
Prerequisite: Algebra 10, Computer Science 10

Topics and Percentage Time Allotments

1. Problem solving   (*)

    - review and extension of problem-solving techniques
    - familiarity with flowcharting and algorithmic approaches with expertise
      in one of these areas

2. Programming   (*)

    - review of the skills from the programming section of Computer
      Science 10 as required (a change of language will necessitate a more
      thorough discussion)
    - programming style
        - flagging
    - additional competencies
        - arrays
        - searches and sorts
            - sorts to include selection and bubble
        - advanced screen graphics
        - direct memory access
          e.g.- CALLS, PEEKS
    - functions
        - built-in
        - user-defined
    - subroutines
    - subprograms
        - library of user-developed subprograms
    - DOS
        - file manipulation
        - file efficiency
        - multiple-drive applications
    - printer graphics (optional)

3. Applications   (10%)

    - further use of utility programs
      e.g.- VisiCalc
    - evaluation of similar programs
        - specialized
        - utility

* These components will be developed throughout the course; that is, not in
single time blocks. Their sequence will be repeated in a spiral approach and
take approximately 85 percent of class time.

4. Assignments (*)

   - regular assignments to enhance programming and problem-solving skills
   - major project
       - development of a complete solution to a problem including oral report
       - continued monitoring of progress and clearly defined timelines are suggested

5. Societal effects: present and future (5%)

   - includes job and educational opportunities