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Computer Studies



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It is our wish that teachers will use this document to improve their teaching and so better attain the key objectives of Seventh-day Adventist education.

Sincerely

Barry Hill.

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SUGGESTIONS FOR USING THE FRAMEWORK

There are many ways to use the framework to help you plan courses, units of work, or topics. The aim is to provide a basic checklist for planning. For topics or units, try the following steps, summarizing your plan on a page or two.

Read the framework overview, philosophy, rationale, subject content outline and objectives on pages 5-8 to gain a picture of the key emphases of your subject.

Check through the list of values on page 12. There are five categories of values. Here you will also find suggestions for teaching values in a general sense..Select those values that seem to need most emphasis, and write them down.

Read the suggestions about values teaching strategies on pages 13-14. An example is making value judgments. Now add some ideas on teaching methods to your summary.

Read the list of issues on pages 15-17. An example is 'the cashless society'. Draw from this list to get ideas for discussion or assignments and add suitable issues to your summary.

For ideas about assessment, check page 20. Assessment must be linked with your teaching content, emphasis and methods. Jot down some ideas.

To see how content, values, issues and teaching methods can be worked into planning, look at the unit summary on page 21. You can now refine your own summary overview page of your topic or unit.

As you can see, you are required to thoughtfully bring together a number of strands in the planning process. By this stage, the topic or unit is certain to be taking on a values-oriented Adventist Christian perspective.

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WHAT IS A FRAMEWORK?

In the Adventist school context, a 'framework' is a statement of values and principles which guide curriculum development. These values and principles are derived from Adventist educational philosophy which states important ideas about what is real, true and good. The objective of the framework is to show how Adventist Christian values and faith can be integrated with academic learning, and it provides some examples of how this can be done. The framework is organized as a resource of ideas for subject planning, so it is intended to be useful rather than exhaustive.

In attempting to present an Adventist perspective, it is clearly understood that some aspects of a course may be taught in similar fashion no matter where it is taught. However at a superficial level the objectives and content of other topics taught in Adventist schools will seem little different from state syllabi merely because the content appears relatively neutral in philosophical terms. With thoughtful teaching there will in fact be differences in content emphasis and approach for these topics, while there will be more noticeable differences in other topics and curriculum processes. These differences of varying degree will stem from the underlying philosophy of the framework.

This computer studies framework contains: an overview diagram; a philosophy; a rationale; objectives; a content outline; a list of values; suggestions on how to teach values; a list of issues; a list of processes and skills; and a unit overview to demonstrate unit planning procedure.

In the framework there is acceptance of the requirement to teach the basic skills, topics and thematic links outlined in the various state syllabi. The document sets out some of these in checklists and gives practical suggestions which will be used in the preparation of course outlines, programs, units and lessons. It therefore becomes a basic reference point for teachers. No attempt has been made to replace an individual teacher's personal programs, but rather to guide the development of these programs. Overall, the framework mainly attempts to show how good practice can be placed in a value perspective which is Christian. It is a tool teachers can use to help them either reinterpret state curriculum documents from an Adventist perspective, or to simply teach from that perspective if the subject is an elective one.

WHO IS THE FRAMEWORK FOR?

The framework is primarily designed for all computer studies teachers in Adventist secondary schools. It also provides a reference point for curriculum planning for principals and administrators in the Adventist educational system. Further, it attempts to show state authorities that there is an Adventist curriculum emphasis which provides some justification for the existence of an Adventist school system. The document is to be used in establishing the direction for any curriculum planning, whether it involves creating courses from scratch, adding to state syllabi, or evaluating units and resources.

FRAMEWORK OVERVIEW

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A DEFINITION OF COMPUTER STUDIES IS:	• The study of the application, operation and social implications of computer- based information technology
THE KEY OBJECTIVES INCLUDE:	 Computer application packages Programming to solve problems The computer as an aid to learning The social implications of technology The theory of computer systems
IT PROMOTES VALUES SUCH AS:	 Co-operation Creativity Honesty Organization Perseverance
IT CONSIDERS ISSUES SUCH AS:	 Changes to the labour market Computer crime Effects upon lifestyle Pollution Privacy
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IT ASSISTS TEACHERS TO DEVELOP STRATEGIES FOR TEACHING VALUES SUCH AS:	 Case studies Identifying and clarifying students' values Making value judgements Role models Using analogies, dilemmas, hypotheticals
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IT DEVELOPS SKILLS THROUGH THE USE OF PROCESSES SUCH AS:	 Creative use of graphics and desktop publishing Data processing in databases and spreadsheets Electronic communication File management Programming Word processing

PHILOSOPHY

Computing studies teachers in Seventh-day Adventist schools make some assumptions about knowledge, truth and beauty. All knowledge is seen to originate from God. He has created it for mankind to explore. Through technology we may examine some of this storehouse of order and knowledge in God's universe. Technology is as much part of God's creation as plants or humans. It does not replace God, but rather helps men find out more about Him.

God created man as an intelligent being with the capacity for logical thought and creativity. Computing technology provides scope for the growth of these capacities in the investigation of creation and the laws by which it is governed. One outgrowth of man's creativity is change, a process given by God, and brought about in part by processing knowledge.

Technology speeds the processing of knowledge, enabling man to find out more about the universe and its Creator. Information which is part of creation is better utilized through technology, and in particular through computing. Thus technology helps develop both knowledge and the world. Mankind has an obligation to use this knowledge in serving others responsibly.

Technology is a means for man to explore and appreciate the order and beauty of creation. There is in technology an inherent beauty which is part of the broader aesthetic quality of the universe.

RATIONALE

There are numerous reasons why students should develop computing skills. Some of these are set out in the rationale below.

Because technology is so pervasive in our world, computers are one means of helping Adventist students understand and use this technology. As computers are a device for processing information, their use can assist students effectively process the huge amount of information needed to cope effectively with the world. Their quality of lifestyle, number of career options, and even survival in a secular society can partly depend on computing skills which help them process and apply information. Also in a rapidly changing society, students need to use much information to live with change and use it to their advantage.

The ability to solve problems has always been vital to survival. Computing can be a tool to creatively help students develop this process in different ways. The logic and order required to solve problems is applicable to many life situations.

Computer skills are an outlet for student creativity, a quality which is closely allied to problem solving ability. Because students are created like their Creator, they have the desire and ability to display their creativity in diverse ways which can be multiplied through using computers. Such creativity as is developed through computing also enhances their opportunities to explore and understand other subjects.

Society is accustomed to a high standard of multi-media communication. It is important that Seventh-day Adventist students understand the nature of this communication as they attempt to relate the messages of the Bible to their world. Computer studies can help them creatively explore possibilities of multi-media presentations in communication.

Student productivity in many aspects of daily living can be improved through computing. As students learn to achieve more calculations, analysis and creation in less time through computer use, they can become more productive service-oriented church and society members.

OBJECTIVES

As a result of computer studies, students should be able to:

Applications:

- Use a range of computer systems competently.
- Use the main features of application packages effectively.
- Determine the suitability of application packages for a given task.
- Evaluate software packages.

Social Implications:

- Identify and discuss the ethical and legal issues relating to computer technology.
- Make informed and responsible decisions about issues.
- Appreciate that computer-based applications affect the lives of people in positive or negative ways.
- Recognise the responsibilities of those who develop, control and use information technology.
- Recognise the extent to which society depends on computers.

Programming:

- Appreciate that programming is a creative activity.
- Describe logical problem-solving steps using an appropriate algorithmic convention (ie flowcharts, pseudocode, structured English)
- Design, implement, test and document a solution to a problem, using the techniques of structured programming.
- Modify and extend existing programs.
- Be aware of the mathematics that supports computer operation.

Theory:

- Understand, define and use computer terminology.
- Recognize and explain the functions and relationships of the major components of a computer system.
- Describe the phases of the systems development cycle.
- Be familiar with a variety of operating systems eg MS-DOS, Mac Icon, UNIX, Apple Pro-DOS.
- Appreciate the history and development of computer devices.
- Appreciate the diversity of career opportunities in the computer field.

Use for Other Subject Areas:

- Recognise how and where computers may be used in other disciplines.
- Demonstrate how computers may be used as monitoring and control devices.
- Transfer computer skills and knowledge to other curricular and extra-curricular situations.
- Creatively explore the use of multi-media presentations in communication.

A SUBJECT CONTENT OUTLINE

Listed below are topics commonly taught in computer studies classes in Adventist schools. Some frequently used computer programs are also listed.

Computer Applications:

- Integrated:
 - MS Works
 - AppleWorks
 - Lotus Symphony
 - Framework
- Word Processing:
 - Word Perfect
 - MS Word
- Data Base:

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- DBase 2 & 3
- Panorama
- Double Helix
- Spreadsheet:
 - Excel
 - Lotus 1 2 3
 - Wingz
- Desk Top Publishing:
 - Pagemaker PublishIt

 - Ready Set Go
- Communication:
 - Netcom
 - Networking
- Graphics:
 - Freehand
 - Printshop
 - SuperpaintDazzle Draw

 - Fantavision
 - Full Paint
 - Visualiser
 - Illustrator

• Simulations:

- Flight Simulator
- Lemonade
- Simcity
- Flowers of Crystal
- Bush Rescue
- Oregon Trail
- Carmen San Diego
- Models
- Voice recognition and synthesis
- Problem solving

Social Implications:

- Crime
- Privacy
- Honesty vs piracy and security
- Mark of the beast (cashless society & big brother)
- Employment versus redundancy
- Power
- Leisure
- · Changing face of the office
- Defence
- Health and welfare
- Home influences
- Information Services
- Equity
- Changing environment
- Ergonomics and RSI

Programming:

- Languages:
 - Basic
 - Pascal
 - Logo
- Algorithms:
 - · Flow charting
- Computer arithmetic
- Boolean algebra

Theory:

- Glossary
- Computer description
- System analysis and design
- Environment
- History
- Careers
- Communication
- Office management

Use for Other Subject Areas:

- Robotics / lego
 Drawing cadcam
 Artificial intelligence
 Accounting
 Music

- Art
 English
 Science

- Bible
 Geography
 Economics
 Maths

VALUES

This section sets out a group of values which are important to computer studies. The list is a starting point to give teachers ideas.

Academic Values:

- Accuracy
- Discernment
- Discrimination
- Efficiency
- Logical thinking
- Order
- Organization

Aesthetic Values:

- Aestheticism
- Creativity
- Enjoyment
- Flexibility
- Fluidity
- Originality

Ethical Values:

- Accountability
- Confidentiality
- Honesty
- Stewardship of resources

Performance Values:

- Ambition
- Excellence
- Iniative
- Patience
- Perseverance
- Reliability
- Self-confidence
- Self-discipline
- Self-worth

Social Values:

- Co-operation Respect for property

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• Tolerance

STRATEGIES FOR TEACHING VALUES

This section of the framework enumerates some suggestions for following a more valuesoriented approach to teaching computer studies.

- Identify values:
 - In discussing the issue of piracy, identify the values involved.
 - State that backing up is not piracy.
 - Get students to read software licence agreements.
- Clarify values:

• If a student says he must copy an inaffordable program, you ask questions such as:

- Would you steal from a computer shop?
- Why would you do this?
- When would you copy?
- What does copyright mean?
- Use analogies:
 - If we trace data history of how we record data on memory, we notice how we store more on less space. If we extend this infinitely, we start to think of God's ability.
- Use dilemmas:
 - Using computers in industry to reduce jobs.
 - Look at the consequences of the two main alternatives.
 - Look at the evidence for supporting each alternative.
 - Evaluate the alternatives by reference to some principles.
 - Make a decision.
- Use hypotheticals:
 - You are working at a bank. Someone would like a list of customer accounts over \$50,000, and they offer you money for the list. Do you give them the names?
- Make value judgements:
 - Evaluate this software package. What are your criteria for making your judgement?
 - Why is the package good or bad?
 - Rank your evaluation criteria in order.
- Reinforcement:
 - You see a creative solution to a Logo task. Praise the good qualities of the task and display it.

- Discussion of issues, values, situations, techniques etc:
 - Which is better, BASIC or Pascal?
 - Why do we have these rules for the computer room?
- Teacher model:
 - Teachers continually model tolerance to others, competence, perseverance, patience, logical thinking etc.
- Classroom climate:
 - Have the room attractive, professional, with up-to-date equipment.
 - Have attractive wall displays.
 - Relate to students with understanding.
 - Organize procedures competently.
- Explanation:
 - Explain why viruses were created.
 - Explain why the computer room must be tidy and secure.
- Choice of content:
 - Refer to calculating devices in the Bible.
 - Choose the NIV concordance as an example of a database.
- Case studies:
 - Find a story about a person who is disadvantaged because an incorrect credit rating is entered into a computer. Draw out the values involved in the case.

ISSUES

Issues of all kinds pervade the teaching of computer studies. As issues are discussed, many values are raised. This list of issues on the following pages is a starting point for teachers.

Cashless Society:

- Monitoring of spending via transaction statements.
- Profiling tastes from transactions.
- Recording information about people.

Changing Face of the Office:

- Are people working at home?
- Are there less people?
- Coping with electronic mail
- Inequality of billing due to faxes
- New skills needed to manage
- Quality of interaction
- Typewriters versus word processors

Choices:

- Alternative program types
- Computers, printers, memory type, screens etc
- Network or not to network?
- Systems development

Crime:

- Automatic-teller machine abuse
- Computer fraud
- Hacking
- Piracy
- Trojan horse programs

Defence:

- Centralized control
- Dependence on computers
- Disasters by malfunction
- Security with computers
- Simulated wars

Employment:

- Loss of skills
- · Loss versus creation of jobs
- · Shift of labour market

Equity:

- · Access according to gender
- Influence of societal role models
- Programming ability according to gender
- Socio-economic bias caused by access differences

Ergonomics:

- Design of furniture
- Electro magnetic radiation
- Office layout, lighting, facilities
- Repetitive strain injury

Health and Welfare:

- Change of lifestyle
- Computer use in cars
- Increased accessability
- What is the future impact?

Impact on Society:

- Art media, animation, styles
- Influence on materialism
- · Relationship to perceived career opportunities
- Synthesized music loss or gain?

Information Services:

- Possible disappearance of some printed media.
- Use of modems, electronic mail in changing communication patterns.

Leisure:

- Computers supposedly increase leisure time.
- Games:
 - Good or bad?
 - Waste of time and money
 - Pornography
 - Violence and sadism

Pollution:

- Electricity supply
- Paper and packing
- Paperless office versus proliferation
- Using recyclable paper

Privacy:

- Australia card
- Australia card
 Credit rating
 Direct selling mail lists
 Medical records
 Tax file numbers

Use of Computers as a Power Tool:

- Bulk mailing industry
 Cannot argue with computers.
 Lack of personal touch in billing
 Receiving 1c or 2c bills

PROCESSES AND SKILLS

Below are listed eight processes and skill groups which are thought important to develop in computer studies. The list is not exhaustive or prescriptive. The intention is to check that the basics are touched on systematically in courses.

Communication:

- Dial up and log on
- Download and save data
- Search and retrieve data

Database:

- Design and print reports
- Edit
- Enter data
- Plan appropriate fields
- Select field attributes
- Sort, search, and select records

Desktop Publishing:

- Design layout
- Edit
- Enter data
- Format

File Management:

- Backup files
- Choose appropriate file names
- Format a disk
- Open, close, delete existing files
- Organize folders / directories
- Save and print files from within an application

Graphics:

- Manage files
- Modify images using editing functions
- Print
- Use drawing and painting tools

Programming:

- Design, implement, test, and document a program
- Modify and extend existing programs
- Use techniques of program design:
 - Flowchart
 - Pseudocode

Nassi-Schneiderman diagrams
Structured English

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Spreadsheets:

- Compare alternative projections
 Display graphs
 Edit

- Enter data
- Enter formulas and functions
- Format
- Plan appropriate rows and columns

Word Processing:

- Create form letters
- Edit
- Enter data
- Format
- Use spell checker

ASSESSMENT

Assessment in computer studies should include a variety of tasks and skills. Some possibilities are set out below. Assessment can include:

- Written test and examinations
- Practical assignment including:
 - Problem solving
 - Programming assignments
 - Reading and interpreting code
 - Writing and modifying code
- Practical tests and projects
 - Computer control (Lego)
 - Data base
 - Desktop publishing
 - Spreadsheets
 - Word processing
- Oral presentations
- Report of case studies
- Debates marked
- Discussion and participation and quality
- Research projects
- Teacher observation of creativity, behaviour, organization etc

ASSESSING ATTITUDES AND VALUES

Values of all kinds can be assessed in computer studies in different ways. For example, the aesthetic and academic values of this framework can be assessed by using many of the strategies for teaching values set out in the framework. To illustrate, students can be given marks for identifying values, for making judgements in reference to criteria, and for working through dilemmas or hypotheticals.

Ethical, social and performance values can be assessed more indirectly without reference to marks. Teachers can, for example, use attitude scales, questionnaires, selfassessment, peer assessment, essays and observation techniques for more informal assessment. These values could also receive a small allocation as part of a large assessment scheme. Teachers can also write descriptive statements about attitudes and build up profiles of students' attitudes.

UNIT SUMMARY

One of the main objectives of this framework is to help you integrate values, teaching approaches, issues and skills with your unit planning. With this objective in view, we have developed a brief example summary of a unit outline below.

DATABASE

Objectives:

- Create a database.
- Describe the purpose of a database using examples.
 Examine social issues arising from the topic.
 Use the main features of a database effectively.

Values:

- Accuracy
- Confidentiality
- Efficiency
- Order
- Perseverance

Issues:

- Accountability
- Computer crime
- Ergonomics
- Privacy

Processes:

- Design and print reports
- Edit
- Enter data
- Format
- Plan appropriate fields
- Select field attributes
- Sort, search, and select records

Content:

- Decide whether a database is an appropriate way to organize data for a particular task.
- Show how a card file can illustrate a database:
 - Backup files
 - Choose appropriate file names
 - Format a disk
 - Open, close, delete existing files
 - Organize folders or directories
 - Save and print files from within an application

• Uses of databases (ie police, bank, medical) to raise the social issues mentioned in the issues section.

Strategies for Teaching Values:

- Use a hypothetical. For example:
 - You are working at a bank. Someone would like a list of customer accounts over \$50,000, and they offer you money for the list. Do you give them the names?
- Select content to include values. Choose the NIV Concordance as an example of a database. For example, set an assignment to search for occurrences of words or phrases such as 'salvation'.
- Use an analogy to explain confidentiality. Just as you would want your written health details or school marks kept private, so computer records of such information must also be kept private.
- Take opportunities to constantly identify values. For example, in using the analogy in point 3, take care to identify and emphasize the value at issue.
- Make value judgements about the programs used in this topic. Establish criteria for these judgements.
- Use a case study of a person disadvantaged by an incorrect use of a database.