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# Teacher Package

## Technological Education Exemplar Task Computer and Information Science, Grade 11, University/College Preparation (ICS3M) Teacher Package

**Title:** Ergonomic Risk Survey  
**Time Requirement:** 6 periods of 75 minutes each

### Expectations Addressed in the Exemplar Task

This task gives students the opportunity to demonstrate achievement of all or part of each of the following selected expectations from two strands: Skills and Processes, and Impact and Consequences.

*Students will:*

1. use selection structures, counted and conditional loops, and nested selection and loop structures;
2. develop appropriate algorithms in text or diagram form to solve problems and verify solutions;
3. use appropriate strategies to avoid potential health and safety problems associated with computer use, such as musculo-skeletal disorders and eye strain;
4. incorporate and maintain internal documentation to a specific set of standards, including author, date, file name, purpose, and explanatory comments of major statement groups;
5. write programs that access sequential files;
6. test completed programs with a full range of valid data to ensure that all components work as expected.

### Description of the Task

Present the following scenario and instructions to students:

*Healthy Valley Medical Centre uses computers in many different environments, such as offices and patient treatment areas. Healthy Valley is concerned with determining if their employees are using their computers in an ergonomically correct fashion. You are working as a co-op student and have been asked to create a 5–7 question ergonomic risk survey that will be implemented as a computer program. The program must provide an ergonomic risk level and suggested improvements for each workstation. The data will be collected in a common file for management use.*

### **Final Product**

Each student will submit:

- a draft of the survey including a scoring guide and suggested improvements for management approval;
- a program plan in the form of pseudocode, flowchart, or diagram;
- a hard copy of the program including documentation and a program test report.

### **Assessment and Evaluation**

The final product will be assessed and evaluated using the task-specific rubric provided.\*

Introduce the rubric to the students when you introduce the task. Review the rubric with the students and ensure that each student understands the criteria and the descriptions for achievement at each level. Allow ample time for a thorough reading and discussion of the assessment criteria outlined in the rubric.

Some students may perform below level 1. Although the rubric does not include descriptions of achievement below level 1, the characteristics of these students' work should be reviewed in relation to the criteria outlined in the rubric.

### **Teacher Instructions**

#### **Prior Knowledge and Skills Required**

To complete this task, students are expected to have some experience in, or some knowledge and skills relating to, the following:

- using research materials (e.g., to obtain information on ergonomics)
- understanding the importance of ergonomics in the workplace environment
- writing pseudocode, flowchart, or diagram
- using word processing software
- using variables, assignment statements, selection structures, looping structures, and file access commands in the language used for the course
- completing a program test report

#### **Accommodations**

Accommodations that are normally provided in the regular classroom for students with special needs should be provided in the administration of this performance task.

#### **Materials and Resources**

You should ensure that students have access to the following:

- a computer and the Internet
- class notes
- print materials (magazines and books)

*Note:* You may wish to provide each student with an envelope or folder for the submission of their final product.

\*The rubric is reproduced on page 9 of this document.

The following URLs have been included as possible sources that students could use for online research, or teachers could print the contents of these websites and distribute copies to the class:

- University of Waterloo Safety Office website, which offers a number of safety guides.  
[www.safetyoffice.uwaterloo.ca](http://www.safetyoffice.uwaterloo.ca)
- R.S.I. Page (Repetitive Strain Injuries)  
[www.engr.unl.edu/ee/eeshop/rsi.html](http://www.engr.unl.edu/ee/eeshop/rsi.html)
- 3M Ergonomics  
<http://cms.3m.com/cms/CA/en/l-30/crirFFR/view.jhtml>
- Typing Injury FAQs and Archive  
[www.tifaq.com](http://www.tifaq.com)

The writers verified the URLs for these websites prior to publication. Given the frequency with which Internet addresses change, teachers should always verify the websites before recommending them for student use.

### **Plagiarism**

It is important that you discuss copyright issues with your students. Copyright applies to text and visual materials taken from both the Internet and print sources. Plagiarism is defined as “using the work (or part of it) of another person and claiming it as your own”.<sup>1</sup>

### **Task Instructions**

*Note:* This task will take approximately six periods to complete. You should develop appropriate timelines for your students. As they work through the task, provide individual assistance, suggestions, and feedback as required.

#### **Steps for the Completion of the Task**

- Discuss the performance task and rubric with the students.
- Review ergonomic concepts with the students.
- Using Appendix A: Example of a Survey, Scoring Guide, and Response Comments, discuss the components of the task.
- Have each student research ergonomic risk reduction strategies.
- Have each student develop five to seven questions for his or her own survey.
- Have each student develop suggestions for workstation improvements.
- Discuss Appendix B: Pseudocode Guidelines and Example with the students. (If you are using flowcharts or diagrams, you will need to provide your students with an appropriate model.)

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1. Canadian Intellectual Property Office, Industry Canada, *A Guide to Copyrights* (Hull, Quebec: Canadian Intellectual Property Office, Industry Canada, 2000), p. 20.

- Review internal and external documentation, selection structures, and file input and output commands with the students.
- Have each student develop a program plan in the form of pseudocode, flowchart, or diagram.
- Discuss Appendix C: Program Details and File Example with the students.
- Have each student write his or her own computer program including a survey, scoring guide, and suggestions for improvement.
- Have the students test, debug, and write a final version of their program.
- Review Appendix D: Documentation and Program Test Report with the students.
- Have each student design a program test report.
- Have students test, debug, and write a final version of their test report.
- In pairs, have students complete Appendix E: Task Checklist.
- Have students make any final revisions and submit all final products of the task.

*Note:* If students are programming in a GUI-environment, they are still required to use IF-statements to determine weights and make suggestions.

### **List of Appendices**

Appendix A: Example of a Survey, Scoring Guide, and Response Comments

Appendix B: Pseudocode Guidelines and Example

Appendix C: Program Details and File Example

Appendix D: Documentation and Program Test Report

Appendix E: Task Checklist

## Appendix A: Example of a Survey, Scoring Guide, and Response Comments

### Example of a Survey

The following example is provided to demonstrate possible question types and formats for a survey.

#### Are you addicted to computers?

1. Do you have a PDA on your night table?
  - a) Yes
  - b) No
  
2. How many hours a day do you use your computer?
  - a) less than 2 hours
  - b) 2 to 5 hours a day
  - c) 5 to 10 hours a day
  - d) more than 10 hours a day
  
3. You would rather e-mail than phone a friend.
  - a) Yes
  - b) No

### Scoring Guide

The following scoring values would not be visible to the user but are calculated by the program.

Question #	a	b	c	d
1	10	0		
2	0	2	5	10
3	0	5		
...				

Survey Score	Computer Addiction Level	Addiction Level Comment
0–5	Low	Not addicted
6–15	Medium	Be careful!
16–25	High	You are a computer addict!!!

### Response Comments

Question #	a	b	c	d
1	No one needs a PDA that much.	You must like reading.		
2	Low risk of RSI	Do you have an RSI?	Do you have a computer tan?	How is your RSI?
3	Do you ever talk to humans?	You're a chatty one, aren't you?		
...				

## Appendix B: Pseudocode Guidelines and Example

### Pseudocode Guidelines

The following are considered standard pseudocode guidelines:

- Start each statement with an action verb, unless the statement starts a control structure.
- Use the following statements for control structures: if, repeat, do, while, case #, loop.
- Use indenting to show control structures and level of nesting.

### Pseudocode Example (Buying Movie Tickets):

*Note:* The control structures are shown in bold.

Set matinee movie tickets cost \$7

Set evening movie tickets cost \$11

Get time of day

#### **Do**

    Get number of tickets

**While** number of tickets <= 0

**If** time of day < 4 pm **Then**

    Set total cost equal to number of tickets \* matinee cost

**Else**

    Set total cost equal to number of tickets \* evening cost

**End if**

Open order file

Send total cost to order file

Close order file

## Appendix C: Program Details and File Example

### Program Details

Please make note of the following programming details:

- The program runs once, then terminates;
- The data input must be validated for each question;
- The suggestions for workstation improvement and overall risk level comment must be displayed when the user has completed the survey;
- The program must add survey results to the data in the master file “**ErgonomicRiskSurveyResults.txt**”;
- The following pieces of information, separated by blank spaces, must be added to the file each time the program is run:
  - workstation number;
  - employee number;
  - question answer weights;
  - total of question answer weights;
  - overall risk level comment.

### File Example

A text file for a three-question survey completed by four different users would look similar to the following:

```
3 1405 0 0 0 0 {Low risk comment}
7 5565 30 20 50 100 {High risk comment}
4 1849 30 5 0 35 {Moderate risk comment}
19 9854 100 10 5 115 {High risk comment}
```

The above file is expanded and explained in the table below.

*Note:* The title row is not included in the file.

Workstation #	Emp. #	Q1 answer weight	Q2 answer weight	Q4 answer weight	Total score	Overall Risk Level
3	1405	0	0	0	0	{Low risk comment}
7	5565	30	20	50	100	{High risk comment}
4	1849	30	5	0	35	{Moderate risk comment}
19	9854	100	10	5	115	{High risk comment}

## Appendix D: Documentation and Program Test Report

### Documentation

Internal documentation must include a header block and descriptive comments.

The header block must include:

- author (*Note:* Due to the nature of this task, all products must be anonymous. Use student or teacher pseudonyms or randomly generated numbers.)
- date
- file name
- purpose

Major statement groups must have explanatory comments.

### Program Test Report

The following test report refers to the sample survey in Appendix A and is designed to show the desired format of a test report.

Test #	Q1	Q2	Q3	...	Total	Level
1	b	a	b		0	Not addicted
2	a	b	a		17	You are a computer addict!!!
3	a	c	b		15	Be careful!
4	a	d	a		25	You are a computer addict!!!
...						

## Appendix E: Task Checklist

Criteria	Yes	No	Comments
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### Survey Research

Is the research for survey questions complete?			
Are there 5–7 questions?			
Is the scoring guide complete?			
Are the suggestions for workstation improvement complete?			
Is your bibliography complete?			

### Program Plan

Does the pseudocode, flowchart, or diagram follow the established standards?			
Is the program plan complete?			

**Program Details**

Does your program follow the standards for internal documentation?			
Does the program use selection structures to determine a risk level and comment?			
Does the program provide suggestions for improvement?			
Does the program make use of looping structures to validate data?			
Does the program append user information to a master file?			

**Test Report**

Does the program test report consider all possibilities?			
Have you submitted all components of the final product?			

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The Ministry of Education wishes to acknowledge the contributions of the many individuals, groups, and organizations that participated in the development and refinement of this resource document.



Printed on recycled paper

ISBN 0-7794-9209-9 (Print)

ISBN 0-7794-9210-2 (PDF)

05-406

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