Foreword

Lero – the Irish Software Engineering Research Centre runs an Education and Outreach Programme. The goal of this programme is to promote computer science and software engineering in the education sector. In particular we target second-level students. We ran an outreach pilot project in three secondary schools for 210 students from October 2007-May 2008. We introduced the Scratch tool that teaches programming concepts to teachers and students. This tool was developed by Lifelong Kindergarten group at the MIT Media Lab and is freely available. Because the teachers and students involved in the pilot project were very enthusiastic about the pilot and eager to learn more, we decided to build a more comprehensive set of materials. With the help of Sean Baker of Iona Technologies, we established links with IT Tallaght and CIO Ireland. IT Tallaght has also run Scratch workshops for transition year students; CIO Ireland is interested in promoting ICT as an exciting career opportunity.

Two secondary school teachers spent the summer of 2008 working at Lero as part of the Science Foundation Ireland Secondary Teachers Assistant Researcher (STARs) program. Muireann O'Brien from Carrigaline Community School, Co. Cork and Brendan O' Sullivan from Castletroy College, Co. Limerick applied their knowledge and expertise of teaching ICT at second-level to developing a first version of a transition unit for transition year students. Transition units (TUs) are one of the new curriculum components in the post-primary education senior cycle. The goal of this curriculum is to teach basic programming concepts to second-level students while allowing them to have fun creating games, animations, stories, art and music.

Working with CIO Ireland, IT Tallaght and with the support of the Department of Education and Science Transition Year Support Service (TYSS), our goal is to roll this material out nationally.

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Introduction

The goal of “Having Fun with Computer Programming and Games” is to promote and instil an interest in computing and to inspire young people such as transition year students (age 15-16) to consider careers in computing on leaving school. “Having Fun with Computer Programming and Games” is a Transition Unit.

This unit of work consists of 10 modules. Each module is distinct; however there is a progression from one module to another. Some lessons from this unit are inspired by the Computer Science Unplugged Series of activities[1] and do not have any requirement for a computer at all. The pack includes a Unit Marking Sheet. One sheet per student should be kept to track their progress in the assessed elements of the course in Modules 8, 9 and 10. This is included in the appendices along with a glossary of the key vocabulary that arises in the lesson plans. By using the Module title pages you can see at a glance the resources required for each lesson. See Conventions used in this Guide on the following page.

[1]Materials derived from http://csunplugged.com/ under Creative Commons Attribution-Noncommercial-Noderivative 3.0 License for more see http://creativecommons.org/licenses/by-nc-nd/3.0/

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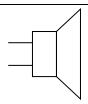
Conventions used in this Guide

Symbol	Resources Required
Computer	Any lesson that requires a **computer**. One computer per pupil is ideal.
Scratch	**Scratch** is the software at the heart of the course. It is available free of charge. A guide to download and install Scratch comes with module 1 lesson 2.
Internet	The **Internet** will be useful for some lessons, particularly when there is a research element involved.
Projector	A **projector display** is the best method for teacher demonstration and for showing slideshow resources.
 Sound	**Sound** can be recorded using a microphone and output using speakers. Don't worry if you don't have any of this equipment as it is only a mandatory requirement for one of the lessons of the unit. It is recommended to use a webcam with a headset included.
Printable Resource	Worksheets or **printed material** copied from the resource pack are required for a lesson when this symbol is present.
CD Resource	Some of the resources such as PowerPoint presentations and Scratch solution files are software based. They come with a CD included in the unit pack and are also available for download online.
Group Work	When **group work** is a part of a lesson this symbol will appear.

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Transition Unit Descriptor

TRANSITION UNIT DESCRIPTOR

1. Title of Transition Unit

Having Fun with Computer Programming and Games

2. Area of Study

Top-up and tasters

3. Overview

The goal of this Transition Unit is to introduce students to computer programming and games in a fun and exciting way. The Scratch software used in this transition unit was designed with this goal in mind. Students will be able to write their own programs, animations and stories in a matter of minutes. Students will learn how to plan and design projects before they are created. They will learn how to work together on a plan in teams and they will have the opportunity to present their work to their peers and teachers. They will learn how to respond and react to audience feedback. They will research a project on the Internet and learn how to evaluate information on websites.

4. Links

This unit will link in very well with maths, digital multimedia class, ICT class

5. Summary Outline of the Unit

Module 1: Getting Started
The goal of Module 1 is to introduce computers and the Scratch tool to students, to allow them to introduce characters and sound in Scratch.
Module 2: Drawing Shapes and Repeating
The goal of Module 2 is to allow students draw different shapes in Scratch and to learn about repetition.
Module 3: Searching and Sorting
The goal of Module 3 is to teach students how to search and sort data. Students are guided on how to search for information on the Internet.
Module 4: Build a Game
The goal of Module 4 is to allow students to build a game in Scratch and to teach students how sounds and images are stored, how they can record and import sounds into Scratch.
Module 5: Revision with Scratch Cards
Students revise some basic Scratch ideas using 3 different levels of cards: easy, difficult and extreme.
Module 6: Changing Things
Module 6 gives students the opportunity to modify existing programs.
Module 7: Solving Complex Problems
Module 7 introduces two complex computer science problems, The Towers of Hanoi and The Travelling Salesman Problem to students.

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Module 8: Research Project
Students are divided into groups and research a topic on the Internet. They present their research topic to the class.
Module 9: Advanced Game
Students implement an Advanced Game in Scratch.
Module 10: Scratch Project
Students are divided into groups and work on their final project.

6. Breakdown of the Unit

Class Contact Time : 35 hours
Module 8 Research Project: 5 hours
Module 10 Scratch Project: 5 hours

7. Aims

This transition unit aims to:

- Introduce students to basic programming concepts in a fun and exciting way using a tool called Scratch.
- Allow students to program computer games and to work in teams to create exciting animations, games and stories.
- Present students with the opportunity to explore their creative and artistic side by creating interactive projects.
- Introduce important computer science research questions that challenge computer science researchers around the world today.

8. Learning Outcomes

On completion of this unit students should be able to:

- Analyse, design, implement and update software projects in Scratch.
- Explain computer science challenges that face computer science researchers today.
- Conduct Internet research and evaluate Internet websites.
- Demonstrate team work. Students are required to complete a final project that will teach teamwork and help students develop good teamwork skills.
- Present their final project to their classmates. This will help develop confidence and good presentation skills.

9. Key Skills	How evidenced
Information processing	Researching and recording information on the Internet for research projects requires students to process large amounts of data in order to evaluate and extract appropriate information.
Critical and creative thinking	Providing feedback to class mates by critically evaluating student research projects. They will have the opportunity to incorporate creative thinking into their Scratch projects and research projects.
Communicating	Presenting a research project and a Scratch project to the class; working in teams to build a Scratch project. Providing feedback and suggestions to classmates.

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Working with others	Planning and designing a Scratch project will give students an excellent insight into working with others, organising and delegating work within a group, taking responsibility for tasks and completing them.
Being personally effective	Writing computer programs, animations, games and stories will give students a great sense of accomplishment and achievement as they will be able to incorporate their ideas and designs and implement them into a finished product.

10. Methodologies

A wide variety of methodologies will be used including negotiated learning, activity-based learning, making cross curricular links in appropriate areas of learning, group work, pair work, discussion, debate, project work and research, use of ICT for research and presentations, use of digital cameras.

11. Assessment Approaches

Students will be assessed on the following units:

1. Research Project, Research Project Presentation, Research Project General
2. Advanced Game Testing
3. Scratch Group Report, Scratch Project Presentation, Scratch Project General

12. Evaluation

Student Evaluation:
See Student Questionnaire in Appendix 3
Teacher Evaluation:
See Teacher Questionnaire in Appendix 3

13. Resources

http://www.lero.ie/educationoutreach/transitionunit/
http://scratch.mit.edu

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Appendices Unit Marking Sheet and Glossary

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