TakingITGlobal
INSPIRE INFORM INVOLVE
INSPIRER INFORMER ENGAGER

LCSI®

With funding from
Canada

Lynx

Projects for Learning to Code

For kids 9+

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Canada

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Table of contents

Introduction

About CanCODE 2019-2021

CanCode is a Federal Government program administered by ISED Canada. The objectives of CanCode are to provide digital skills training to K-12 students and teachers in Canada and to promote awareness and interest in coding and robotics.

The long-term goal is to make Canada a leading innovation economy with a diverse and inclusive workforce.

CanCode funding is directly responsible for the availability of this book as the writers, editors, artists, and printers have received Government of Canada funds for their efforts.

What an expert says

We have successfully integrated Lynx into our culturally responsive mathematics project in a number of Grade 3 to Grade 8 classrooms in Ontario. For this project, we explored the interaction between Lynx coding and Indigenous design, technology and artistry as part of our exploration of the mathematics of Algonquin loom beading and Métis finger weaving.

Using Lynx, students analyzed the structure of the beadwork or weaving, articulated that structure by writing code, and then wrote new procedures to create new beading or weaving designs.

The dynamic nature of Lynx allowed students to explore the different interpretations of mathematical concepts inherent in the work, which then allowed us to more fully analyze students' mathematical understanding.

The students loved writing code for their turtles to create beadwork or weaving designs. They created more and more sophisticated procedures to progress from, for example, creating a single bead, to using the repeat command to create multiple beads, and ultimately full bracelet designs.

The designs that the turtles created, using the code written by the students, did not always align with the students' intended creations. This provided the students numerous, wonderful opportunities for problem solving!

Ruth Beatty, PhD
Faculty of Education
Lakehead University

Get ready for this coding adventure

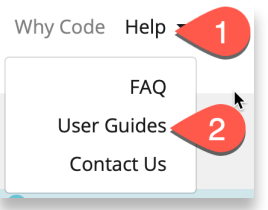
In many ways, coding is good for you. It forces you to think and solve problems. Knowing how to code will probably help you with school projects right now but it will certainly give you the 21st century skills you will need to succeed in the next 15 years.

If you are ready to move on from block coding but not really enticed by these "grown-up picky-syntax" languages like Javascript, Lynx offers a text-based programming environment, both serious and fun at the same time. The skills you learn with Lynx will ease your transition to JavaScript or Python. Plus, it makes project management and sharing super easy, with cloud and social media integration.

Better yet, Lynx was designed by Canadians and includes Canadian spelling and Canadian clipart and themes.

Create an account!

To code the projects in this book you need to create a time-limited **Trial** Account. Look for extensive instructions in the **User Guides** section of the Lynx web site. Go to lynxcoding.club, click on **Help**, then **User Guides**. Read the document **How to create a free trial account** in the section **All about registration and accounts**.



You can also watch a video that shows you how to create an account: **sites.google.com/view/lynxcoding-org/cancodetolearn/what-is-lynx/getting-an-account**

If you are enjoying coding with Lynx and since Canadians can use Lynx for **free** we suggest you upgrade to a permanent **Individual** account. Look for the document **How to convert a free trial account…**, in the same list of **User guides**.

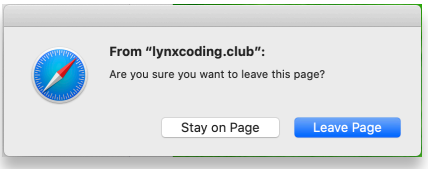
After you have registered, every time you start Lynx, you need to Login. Look for these words in the top right corner. Once you have logged-in, your login name will appear there.

Saving

Important: There is **NO Auto Save**. You must save your work regularly by clicking the **Save** icon.

You may see a small red dot under the cloud. This indicates that your project contains something that has not been saved recently. This is a reminder to save! You don't want to lose your work!

Whenever you try to leave the Lynx Editor (closing a window, going to My Projects, etc.), Lynx *may* display this dialog box:



This is your browser saying: this page has some unsaved stuff. If you leave this page now, *you will lose your latest work*. Stay on that page and use the **Save** button before leaving if you wish to save the last changes you made. If you just saved, this dialog box won't show.

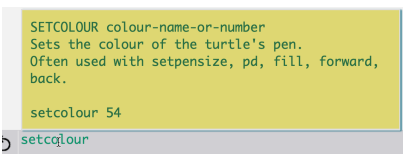
Help and resources

Besides the book you are looking at right now, Lynx offers plenty of help…

Inside the Lynx editor while working on your project

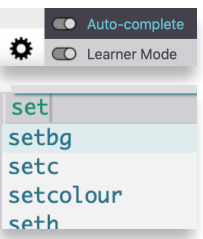
Tooltips

Leave the mouse pointer on a Lynx **primitive** (built-in vocabulary) and you will see something like this image on the right: a short definition and example. This is especially useful to find out the type of input some primitives require (in this example, `setcolour` needs a number).



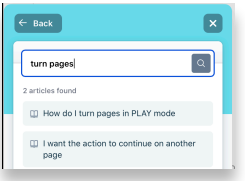
Auto-complete

If you turn on **Auto-Complete** in the **Settings** menu, which we suggest for beginners, as you type in the Command Centre or in the Procedures Pane, Lynx will display a list of primitives that match what you seem to be typing.



Welcome to Lynx

Help widget

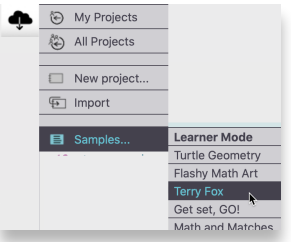


The **Help widget**, located at the bottom-left of the window, opens a floating box where you can type questions and get related explanations. Type very short questions or concept words.

Online Lynx dictionary

The small book icon in the bottom-left corner of the window opens a floating window containing a good dictionary of Lynx primitives, organized by topics (graphics, text…). The explanations and examples are more generous than those of the tool tips. It also contains the chart of Lynx colour names and numbers.

Lynx built-in samples



Open a sample from the list in the **Down from the cloud** menu. You can play with it, look at the code and comments or copy some code for your own project.

Be aware though, in order to see a sample project, you must leave the project you are currently working on. If need be, take the time to save your project before you go see a sample project.

Lynx colour-coded formatting

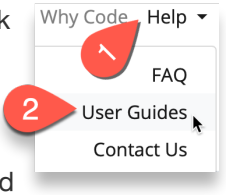
In the Procedures Pane and in the Command Centre, your instructions are automatically colour-coded by Lynx as you type:

```
1 to square :size
2   ; Turtle and text box required
3   repeat 4 [forward :size right 90]
4   print sentence 'This square is: ' :size
5   end
```

Lynx primitives (built-in vocabulary) are **green**. Procedure names (additional vocabulary added by you in the project) are **teal**. Inputs (values required for primitives and procedures to work), including variable names, are **red**. Comments are **grey**. Plain text is **blue**.

If you are outside the Lynx editor

PDF user guides



Visit the Lynx home page (**lynxcoding.club**), click on **Help** (1), then on **User Guides** (2). You will find lots of PDF files with plenty of detailed explanations about registrations and accounts, short easy-to-follow activity cards, longer projects including an advanced video game project, and good resource materials like a 30-page **Getting Started** book, the complete list of (200!) Lynx primitives, detailed explanations about the grammar and syntax of the Lynx language, and how to organize your projects (folders, public, private, properties, deletion, etc.) and share projects.

Lynx templates and Sample projects in All Projects page

At **lynxcoding.club**, go to the **All Projects** page, and open the **Templates** folder. These projects contain some code, and often, clipart that you may want to use for your own project. If there is a template you like, simply open it, **change its name**, and **save** it; it will then be your own project, in your private Lynx cloud area (you will now see it on your **My Projects** page).

The same applies to the sample projects in the other folders. The folder **Learner** contains simple projects, and the folder **Advanced**, well, more advanced projects. There are other themed folders like Math, Games, etc.

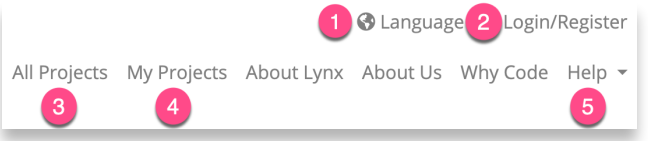
Cancodetolearn.ca

This comprehensive web site **cancodetolearn.ca** (sites.google.com/view/lynxcoding-org) contains instructions for making projects, in the form of topic-based cards, project guides, short how-to videos and comprehensive webinar recordings, about 50 minutes each. Projects include a greeting card, probability problems, a hand-made calculator, a working ecosystem, a simulation of gravity, etc. You can view the materials online or download and print them all (PDF format).

The Lynx environment

THE BASICS OF PROJECT MANAGEMENT

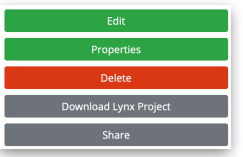
Let's tour the Home page (**lynxcoding.club**)



1. Choose **English** in the **Language** menu as we use English in this book. Feel free to code in French, Ojibwe, Mi'kmaw or Mohawk!

2. Once you're logged in, you are on the Lynx Home page, you will see your name in the top, right corner instead of "**Login/Register**".

3. **All Projects** is where you will find all the projects that other Lynx users have made public, plus some projects, samples and Templates prepared by the Lynx Team.



4. **My Projects** is your private area where you will find your own projects. Click on a project to see it in **Play mode** (no Command Centre, no Procedures or Clipart Pane - just the project *as-is*), then choose one of these options to **Edit** the project, change its **Properties** (title, preview image etc), **Share** the project with friends, **Download** a copy to your computer (backup), or **Delete** it (careful, you **can't** recover a deleted project).

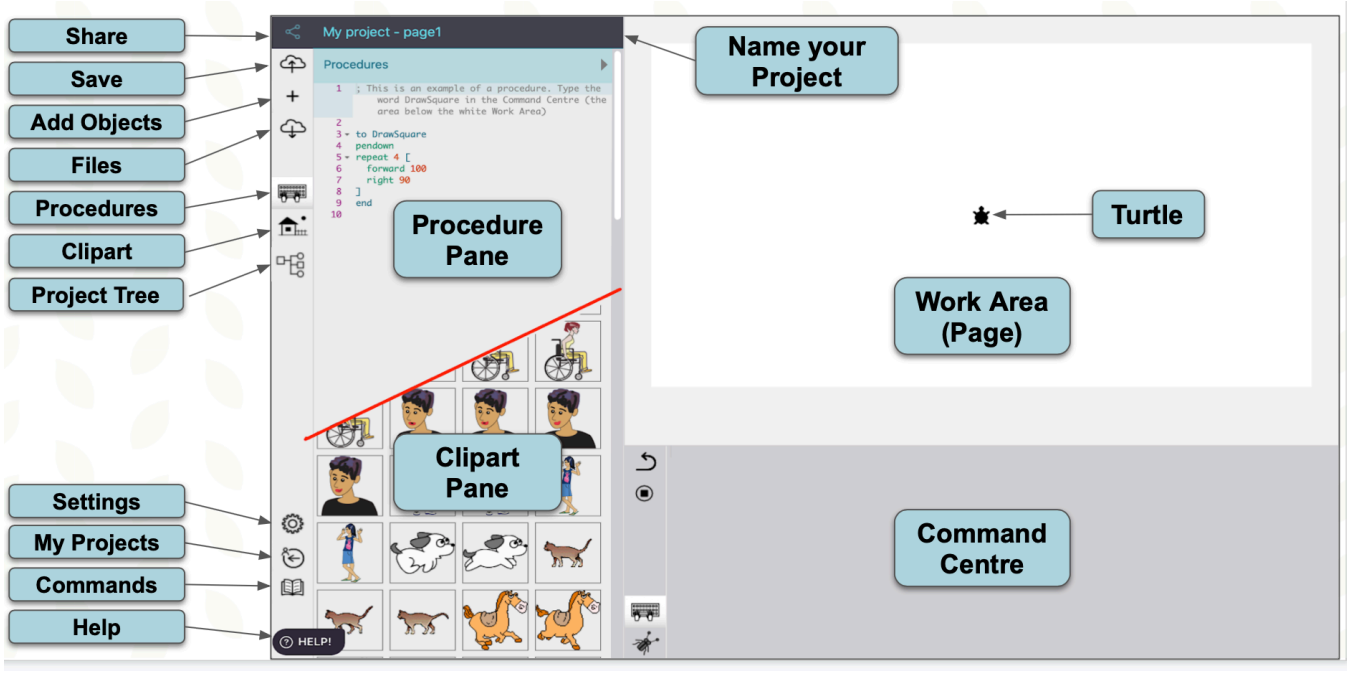
5. **Help** is where you will find FAQs, contact information and the extremely useful User Guides:

- All about registration and accounts
- Quick, theme-based activity cards
- Longer Project plans and teachers' notes (intro, intermediate and advanced)
- Other resource materials: Getting started, Colour chart, Complete list of Lynx primitives (200!), Lynx vocabulary and syntax, and Organizing and Sharing your projects.

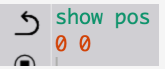
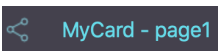
Read more about the Lynx environment in the User Guides **Getting Started** and **How to share a project**. For now, **Login**, and on your **My Projects** page, click on **Create a Lynx Project** (big red button).

The Lynx project editor

These are the components of the Lynx editor. Read more about them on the next pages or in the User Guides



Welcome to Lynx

Work area (page) 	Your project happens here. Think of it as a blank canvas or empty stage. A project can have multiple pages.
Command Centre 	Below the Work area you type instructions here that are executed *immediately*. This is a good place to "practice" things. Think of it as your rough draft area. This area is NOT part of your project, therefore it is not saved with your project.
Name your project 	Click on this field to give your project a new name. If you don't, *all* your projects will be called "My Project" - not a good idea! This field also displays the name of the *current page*, and arrows to turn pages.
Procedures icon and Procedures Pane 	Click on the **Procedures** button to display the Procedures Pane. This is where you create procedures. More about procedures later.
Clipart icon and Clipart Pane 	Click on the **Clipart** button to display the Clipart Pane. This is where you store clipart that you can use as backgrounds and turtle shapes.
Project tree 	Click on this button to see all the pages and all the objects found in each page. Click on the small triangle to expand a page, click on an object to select it, then click on **Edit** to open its dialog box, or on **Delete** to delete the page or object. If you delete something, it is gone!
Share 	Click on this button to choose ways to share your project with friends.

Save 	This button saves your project in its current state. Save often as there is NO autosave.
Add objects 	This button opens a menu with commands to create new turtles, buttons, text boxes, etc.
Files 	This button opens a menu with commands to to go to My Projects, all public projects, create a new project, or open some sample projects.
Settings 	Use these options to make Lynx look the way you want, choose font size and work the way you like.
My projects 	Quick access to your projects. Don't forget to save your project before you leave it!
Commands 	This button opens a new window with plenty of information about Lynx primitives and its colour palette.
Help 	Another good place to get help. Enter a question here (ex: "how to animate a turtle") and see the results.
Undo 	Click on the **Undo** button immediately after running an instruction that produced an undesirable result.
Stopall 	Click on the **Stopall** button to stop everything that is happening in a project. If the action started by clicking on a button or a turtle, you can click on that button or turtle again to stop the action.
Debug 	This debugging tool will help you as a programmer. You can set a breakpoint (to pause your program) at any line of your code and see what is happening on the screen and also the values of all your variables at this point.