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## Scripting Tutorial – Lesson 20: Guidelines for Lua Nspired Authoring II

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### WORKING ACROSS PLATFORMS (Create Once Play Everywhere)

#### 2. Control Considerations: Working Well Everywhere!

Our digital content needs to not only LOOK great, but it must also be an intuitive and satisfying experience for the user, no matter what platform it is running on.

For most computer users, the mouse is the most natural medium with which to interact with digital content. Clicking and dragging is fast and smooth and needs little or no instruction.

On the handheld, however, even with the vastly improved mouse/cursor experience, it is nowhere near as fast and satisfying as it is on the computer. Grabbing and dragging remain key points of user difficulty. Making effective use of the handheld keyboard can offer significant advantage in raising the usability of our documents.

And this is just the tip of the iceberg. Practical and significant design considerations are required to ensure that created content will run effectively, not just on handheld and computer software, but on the Player, in PublishView and elsewhere. Certain clear principles can help to guarantee a high degree of confidence in this regard.

Essentially, the key to success in this regard is duplication of all necessary functionality for mouse and keyboard, so that the user may readily choose either control method, depending upon the platform or even personal preference.

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- **2.1 Mouse Control and Classes**

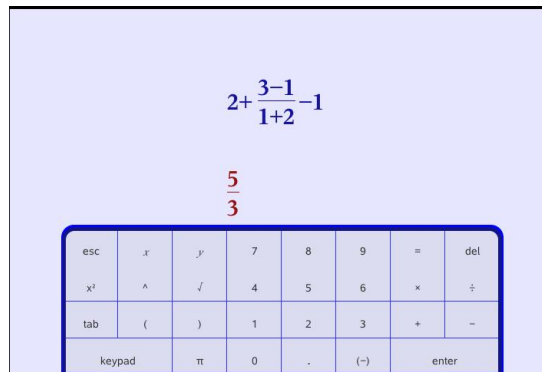
Regardless of the relatively minor obstacles to effective use of the mouse on the handheld, the point, click and drag interface remains common to all platforms, and so should be the first priority in designing and planning for user interactions.

While they may appear a little challenging to set up, the most effective way to ensure a good mouse experience is to define all clickable objects using classes, leveraging the advantage this offers in terms of the powerful "contains" element, as well as the many parameters that can be controlled with ease once a class has been defined.

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- **2.2 Buttons and KeyPads**

If the Player is to be a possible platform for content, then it is critical that all necessary actions can be performed using mouse controls, and that clickable buttons provide access to all necessary features and functionality. Keyboard entry and even menu options are not an option for the Player.



Templates, such as the KeyPad template included for download with this Lesson, offer relatively easy ways to include such features in created documents.

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- **2.3 KeyBoard Object Selection and Control**

At the heart of this usability issue lies the handheld environment, where the mouse, while available, can be cumbersome and even slow in selecting and dragging objects as required. Keyboard methods offer a much more effective user experience. The *mouse\_dragging\_v1.2.tns* document included illustrates a simple example of the principles recommended here.

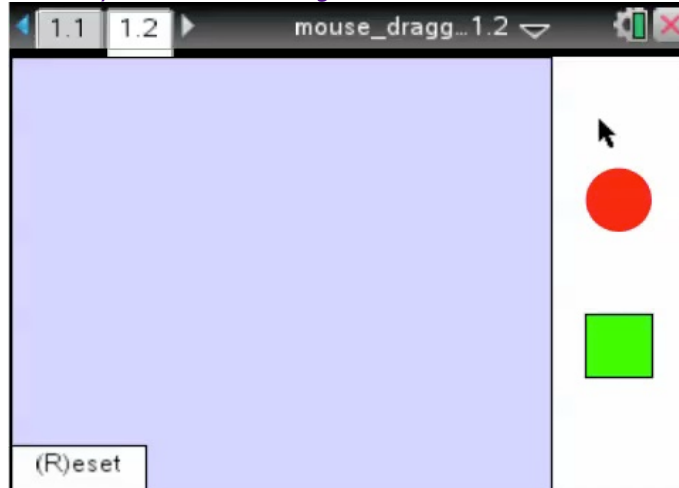
While objects may be easily selected (and cloned) by clicking with the mouse and then dragged, these key actions may also be achieved using keyboard controls:

- Pressing the tabKey (or shift-tab) selects each object in turn.
- Using the arrowKeys will first

clone the selected object and then move it around the screen quickly and easily.

- Alternatively, use the `tabKey` to select an object, and then simply move the mouse – the object will "jump" to wherever the mouse is!

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- To release a selected object, press the `escapeKey`.
- To reset, click on the button provided, press enter or press "r" (or "R").

NOTE: Possibly the most efficient means of controlling objects is to use a *combination* of keyboard and mouse controls! Select quickly and easily using the `tabKey`, and then move the mouse slightly to have the object immediately take that position.

What happens when we have more than just two or three objects to select and control? Tabbing through many objects is not a profitable user experience.

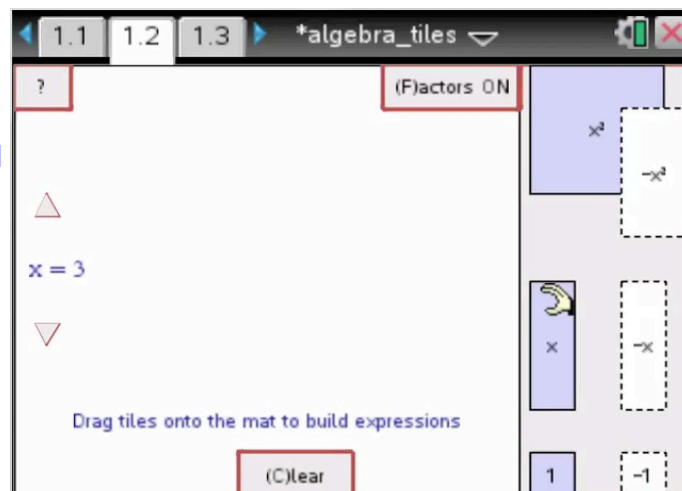
The Algebra Tiles example included offers a fairly high level exemplar of all of the principles we have discussed here. The solution adopted for the six different object types was to use

was to use the keyboard to select an object by typing a letter: type "x" and x-tile is selected, ready to jump to wherever the mouse is. Press "s" for x-squared and "u" for a unit tile. For negatives, press "n" and then the required letter. This approach proves to be

at least as efficient as using the mouse in general, and certainly more effective on the handheld.

Study other features of this document. Press "?" or "a" to bring up a multi-page "About" screen with detailed instructions. Press numbers to change the value of x, or press "+" and "-" to change the values in increments of 0.1.

[Click anywhere on this image for a video demonstration](#)



This document serves to embody the key principles established in these guidelines. Feel free to copy and paste the code that you require from any of the attached files, and to adapt to better suit your needs.

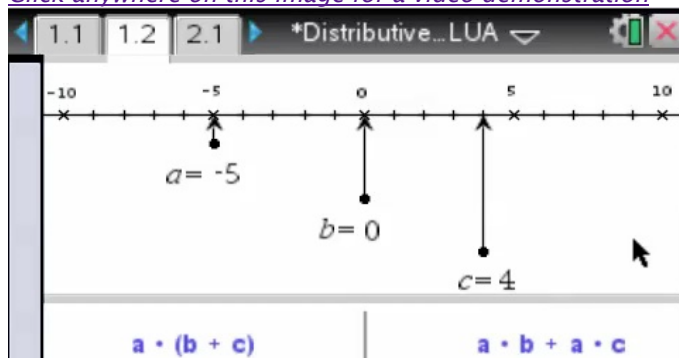
## • 2.4 Arrow Key Control

We have already noted that grabbing and dragging objects on the handheld can be a source of some frustration. One of the opportunities that first drew me to Lua was the ability to easily assign control of object movement to the arrow keys – whether those objects existed within the Lua window, or "outside" in TI-Nspire "world". While this has been implied in the preceding sections, it is important enough to rate its own guiding principle:

*Whenever possible, documents should be designed so that the movement of points can be controlled using the arrow keys, in addition to grabbing and dragging with the mouse.*

This is easily achieved using the arrowKey functions, especially when there is just a single "driver" point. If there are multiple points, then consideration needs to be given for effective techniques for selecting these. Again, relatively easily achieved using classes, but equally possible without. In

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without. In the example shown, there are three "driver" points, a, b and c, and these exist within a native Graph window, so classes are not an option. The tabKey is used to jump from one to the next (the coordinates are stored in a Lua table/list and tab simply steps through this table). In order to visually indicate the currently selected point, a small red segment was attached to another point, similarly controlled.

$= -5 \cdot (0 + 4)$	$= -5 \cdot 0 + -5 \cdot 4$
$= -5 \cdot (4)$	$= -0 - 20$
$= -20$	$= -20$

Documents designed in this way are ready for students to begin controlling the action as soon as they enter the page. No need to move across the page to a particular point location, no need to try and grab and drag the point. This may seem trivial to a computer user, but it is far from trivial on the handheld. This approach offers significant performance and ease-of-use advantages which should be utilized as a matter of course when designing documents.

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