Teacher/Mentor Notes.

The purpose of this Challenge is to assist the student to be able to teach his/her robot pet to move by itself.

The robot pet was built in the last Challenge. However it will just sit there like an inert lifeless lump of plastic until we teach it to move by itself. Teaching our Robot Pet how to behave is a four-part process.

1. We type instructions for our Robot Pet into our computer. These instructions will tell our Robot Pet what we want it to do.
2. We plug in a cable to connect our computer to our NXT Robot Pet.
3. We send the instructions from our computer into our Robot Pet.
4. We unplug our Robot, start it, and watch it go!

Will this Challenge fill a two-hour session?

Probably not. This is a short Challenge.

It may perhaps be possible to complete the next Challenge during this session as well, if your students are making fast progress. One of the reasons I have kept these first few Challenges short is to try to allow for the type of starting-up problems that seem to happen frequently in semi-technical courses like this. If everything is going well, you may be able to get ahead - if all hell has broken loose, and can be fixed, this short Challenge will at least mean that your students will have completed something useful during this session!

(Mostly Non-essential) Semi-Technical stuff about this Challenge.

This Challenge has been broken into eight sections:

1. ***Start up Lego MindStorms NXT 2.0 software on your computer***. If you have not yet installed the Lego MindStorms 2.0 software program that came on a DVD with your NXT set, you must do it now; otherwise you will not be able to proceed further with this series of Challenges. If you are in a School, this may be a problem. Many schools do not allow teachers to install software on their class computers, and you will have to get your friendly Techie to do this. This will not be quick. Have emergency back-up lessons available in case (s)he has come down with chicken pox/flu/whatever and won't be around for ages…

2. ***Choose a name for your list of Robot Pet instructions***. This can be any name – preferably one that is polite! Upper, Lower case letters and numbers can be used in the name. If your students try to use the characters < (less than), > (greater than), : (colon), " (double quote), / (forward slash), \ (backslash), | (vertical bar or pipe), ? (question mark) and * (asterisk), their Pet name will not be accepted, because these characters have special meanings to the computer. It would also be best to avoid the names CON, PRN, AUX, NUL, COM1, COM2, COM3, COM4, COM5, COM6, COM7, COM8, COM9, LPT1, LPT2, LPT3, LPT4, LPT5, LPT6, LPT7, LPT8, and LPT9 as these also have special meanings in Windows. If you have students in your class who speak languages other than English, then theoretically Windows allows Unicode (foreign language) characters to be used in the Pet name, but this is probably not a good idea as we have not tested the use of these Unicode characters, and so can't usefully comment.
3. ***Making a list of instructions for your Robot Pet.*** Lego has developed a computer "language" called NXT-G which is used to instruct your Robot Pet. In English we create a list of instructions by using words. In NXT-G, we create a list of instructions by pulling shapes (also called icons) down from on-screen menus, and connecting these shapes together on the computer screen. If you have not done this before, it is well worth have a sneak peek at the videos before letting your students loose on them – the process can be a bit confusing at first, but after practice becomes fairly straight forward – well, for the students anyway! The students I've taught pick this up at (by my standards) an incredible rate, perhaps because their thinking is less "blinkered" by past expectations than the thinking of many adults (e.g. me!) Your students will have fun – why not let your inhibitions down just a little bit and have some fun too…
4. ***Use a cable to connect your computer to your Robot Pet.*** The purpose of this connection is to enable the list of NXT-G instructions (also called an NXT-G program) that your students have constructed, to be sent from your computer down into your Robot Pet. This process is referred to by Techies as "downloading the program" from the computer into the Robot Pet. "Program" and "downloading" are terms you can introduce your students to if you desire to do so, but in my experience the most important thing is that the students enjoy this process, and they can pick up the semi-technical terms later…
5. ***Send your list of instructions from your computer down into your Robot Pet.*** This is achieved by clicking on a special lower-right hand portion of the computer screen. Watch the video to see which portion.
6. 6. ***GO Robot GO!*** Your Robot Pet is unplugged from your computer. The correct buttons on the Robot Pet are pressed (look at the video). It moves, all by itself! WOW! Note that your Robot is moving by itself, and is not connected to a remote control. When students downloaded their list of instructions into their Robot Pet, they, in effect, gave their Pets a little bit of intelligence. This is the tiniest step towards adding a form of artificial intelligence to their Pet. Awesome! However, after a while reality will strike. The students will find the truth of the classic saying,

"Robots will do exactly what you tell them to do, which is not always the same as what you want them to do…". This can be quite a nice opening to introduce and discuss the idea of "planning" to your students. Some teachers introduce "flowcharts". Some teachers introduce "shopping lists" or "recipes" of robot actions that are to be performed. Over to you**...**

7. ***Other things to try.*** Basically, this section is suggesting that students have a play with the NXT-G commands, to learn more about the effects of these commands. This can keep your brighter students occupied while the slower ones catch up. Take a look at the video for ideas.
8. ***You can save your list of instructions for use next time.*** If you have experimented and cooked a delicious cake, it would be a good idea to keep a record of the recipe so that you can experience the pleasure of that cake again. Similarly, it is a good idea to keep a record of the list of Robot Pet instructions, so you can play with it again later. To do this, you "save your program to disk" (watch the video). You will be able to find your list of instructions again next time, by looking for the name you chose in step 2 of these notes. If you are following these notes at home, you will almost certainly have no problems finding your list (program) again. If you are at a School, you may have problems. Schools at which I've taught have had computer systems that have all sorts of weird places to store student programs. They can be difficult to find again. If you are completely stuck, another call to that friendly Technician can be useful, as can a back-up lesson…

In the third Challenge, we attempt to get our Pet to speak, look happy and disappointed, all while going forwards and backwards a pre-defined distance. Looks fun…