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VR in the Schools

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Introducing Primary Students to VR with Do 3D

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Introduction: The need for a simple VR tool in classrooms

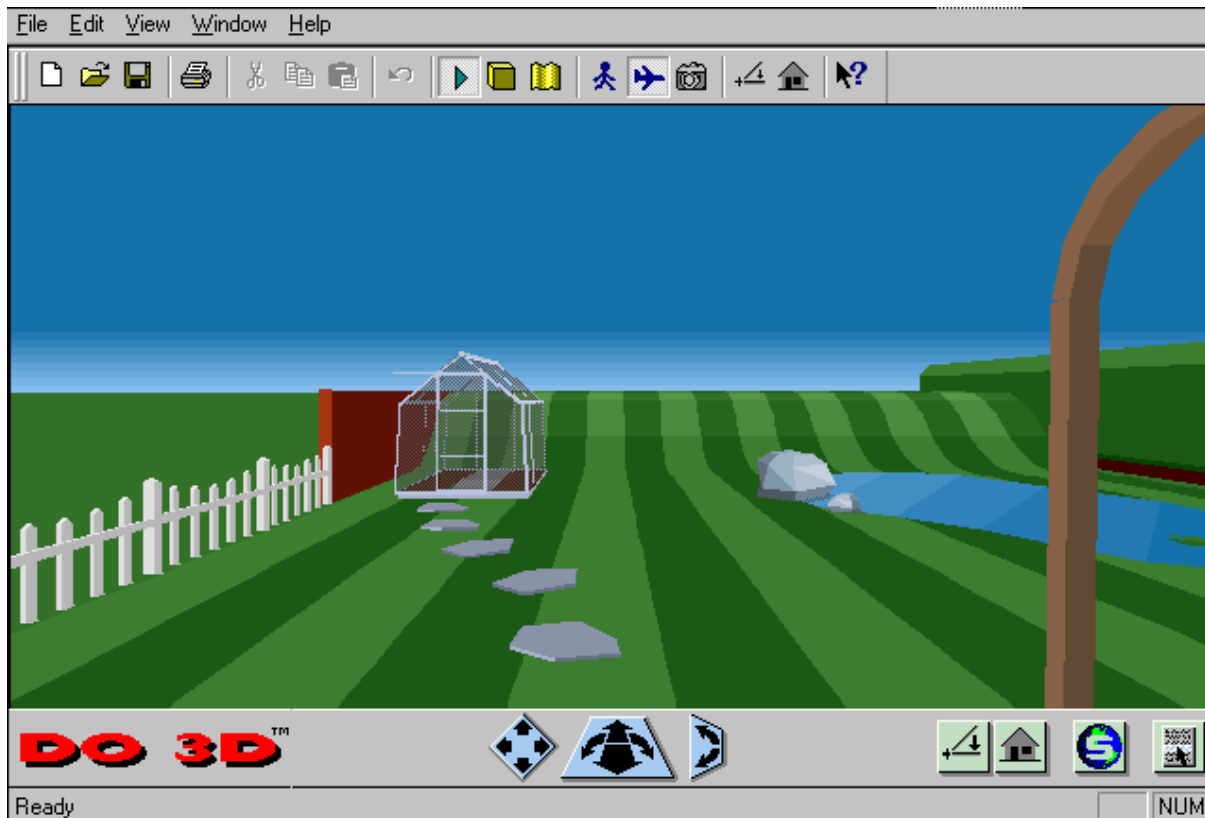
Since I began using VR with primary students in 1995 I have found that students require several hours of tuition in order to reach the stage of being able to use the programs competently without further help. As a visitor to classrooms, working only with individual students or at most small groups, I have been able to give the students involved a level of tuition that would be difficult for teachers to provide. I have repeatedly found that although the educational potential of VR has appealed to many teachers, they have been concerned about the difficulties they see in learning the programs and teaching them to their students.

Superscape's Do 3D

In 1998 I found a program that appeared to overcome this problem. When I first used [Superscape's Do 3D](#) I formed the impression that it is easy to learn and has strong advantages for novices. Although easy to use, it has some powerful features, and it has considerable educational potential. I also felt that the program has features that could be very appealing to students, in particular the ability to make people, animals, vehicles, and some other objects move and to attach sounds to objects.

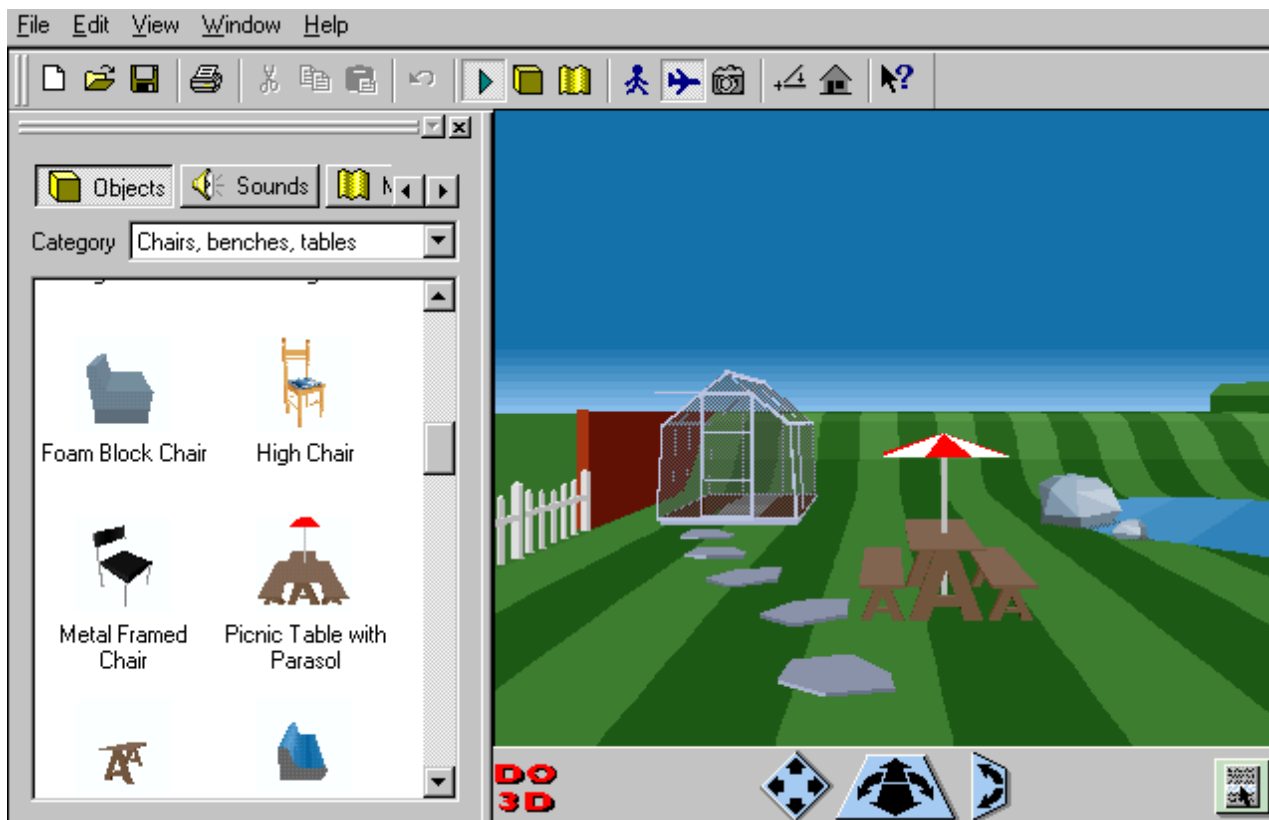
In its simplest form, Do 3D displays only the 3Space window, where worlds are built and previewed. For a

student's first experience of VR it may be used, as shown below, to display one of the partially built worlds that the program provides and to teach the basics of navigation.

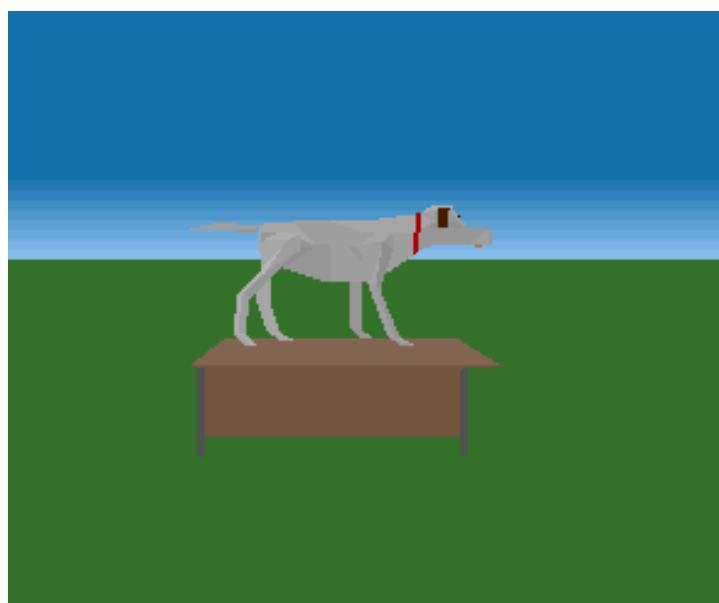


Navigation is achieved in the usual manner, by clicking and dragging on the navigation buttons. To simplify matters at this stage, the walk button may be selected, thus reducing the possible movements, and later the full range may be obtained with the fly button. Two features that help novices who may easily become lost are buttons to level the world and to return to the starting viewpoint.

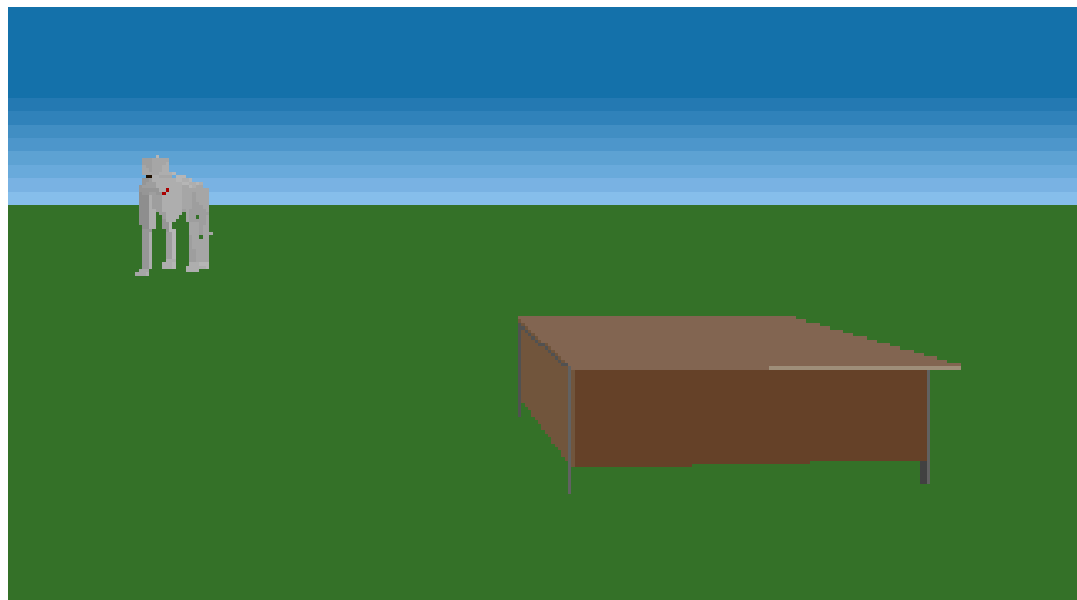
In VR generally, world building may be achieved in either of two ways or in combination. One option, the easiest, is to build a world using objects created by someone else. The other more demanding approach is to draw the objects or to build complex objects from basic shapes supplied by a program. Although the latter is possible to some extent in Do 3D, it is more suitable for the former. The program is supplied with warehouses containing numerous objects, and building worlds with them is both quick and easy. For example, copying the picnic table into the garden is a simple matter of dragging and dropping.



When working in three dimensions it is frequently difficult to see how objects are positioned relative to each other and the ground, without examining the world from various viewpoints. For example, from the front the dog appears to be on the table,



but, from the side, is hanging in thin air.



Students who are not familiar with working in three dimensions tend to find this aspect of VR troublesome. In Do 3D, coloured lines, visible only when an object is being moved, clearly indicate its location, and overcome the problem.

By means of dragging and dropping objects from the warehouses, complex worlds can be built in a short time. There are many objects to choose from, and each object may be used repeatedly. Worlds may then be modified by adding textures, colours, and sounds to objects; changing size and shape of objects; or changing the appearance of ground and sky. People, animals, vehicles, and some other objects move, either automatically or under the control of the viewer. Some movements and sounds may be modified in interesting ways.

Pilot study

1. Criteria for the VR program

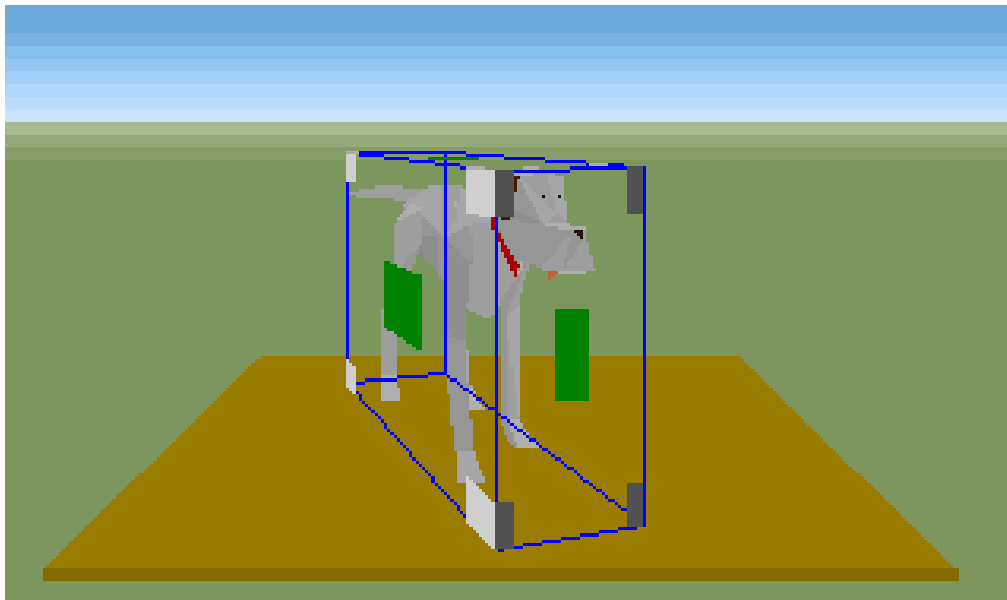
My work on introducing VR into classrooms has focussed on schools in the city where my university is located. Recently, however, the university provided funds for me to visit a sample of twenty primary schools across the state, in order to introduce them to VR. I was able to spend only one day in each school, and therefore the VR program had to meet the following criteria.

1. Given that primary students could not be expected to spend a session of several hours on learning the program intensively, it was necessary to cover the essentials in no more than one hour and for the students to remember what they had learned.
2. Students should be able to master enough of the program basics in an introductory lesson to be able to cope subsequently without further help from me or intensive help from the teacher.
3. Given that in one day I could not teach all the students, those who had not received tuition from me should be able to learn the basics from those I had taught.
4. The program had to be appealing to the students so that they would wish to develop their skills.

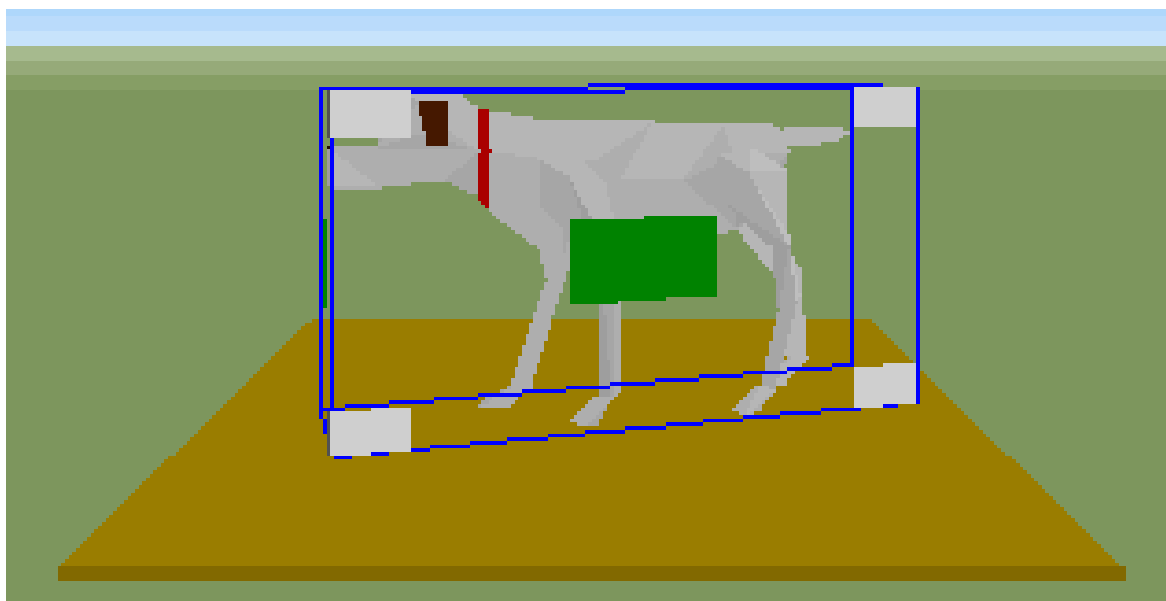
2. The introductory tutorial

I felt that Do 3D met these criteria, and I introduced it to students from grade 3 to grade 7 in the twenty schools. According to age of students and available time, I worked with each group for no less than 40 minutes and for no more than 1 hour. I believed that it was very important for the students to learn by using the program rather than by watching me demonstrate. I felt that in order for students to have a regular turn with the mouse, and to be able to see the screen comfortably, groups should be no bigger than four and preferably only two or three. I planned for the sessions to follow the format described below, not necessarily expecting all students to complete all steps.

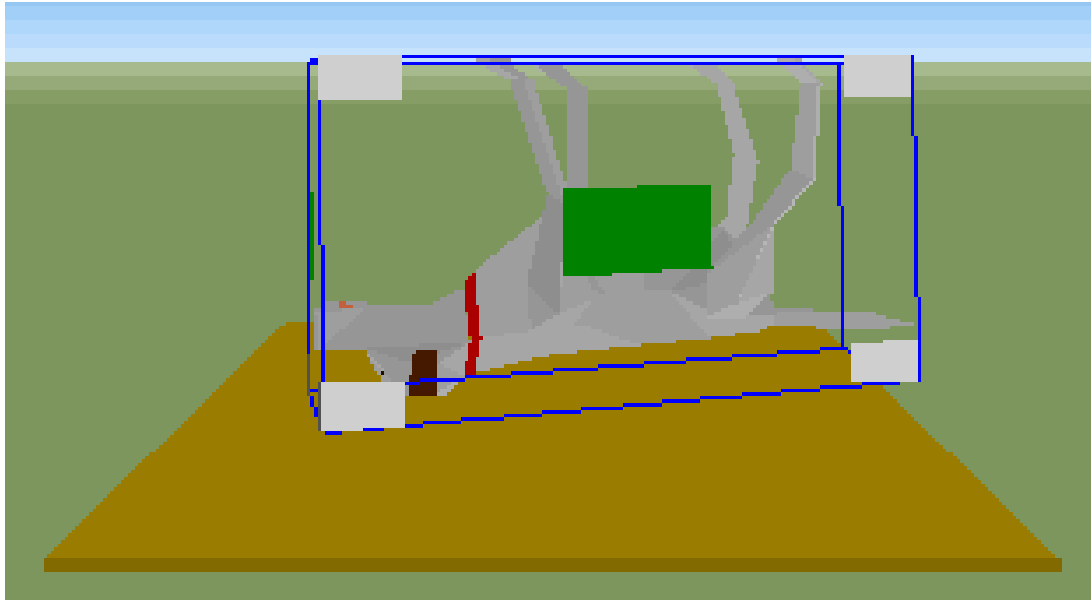
1. Starting the program. The option of a blank world or partly built world.
2. Learning navigation in a partly built world with only the 3Space window displayed. Using walk mode, then fly mode. Levelling the world, and overcoming being lost by resetting the world.
3. The warehouse window. Choosing objects, sounds, or materials. The range of objects available. Adding objects to a partly built world by dragging and dropping.
4. Placement of objects by observing the system of coloured lines that indicate position.
5. Switching between Edit mode and Play mode. Selecting objects in Edit mode. In Edit mode, the currently selected object is surrounded by an editing frame.



6. Rotating the object vertically by dragging one of the vertical lines.

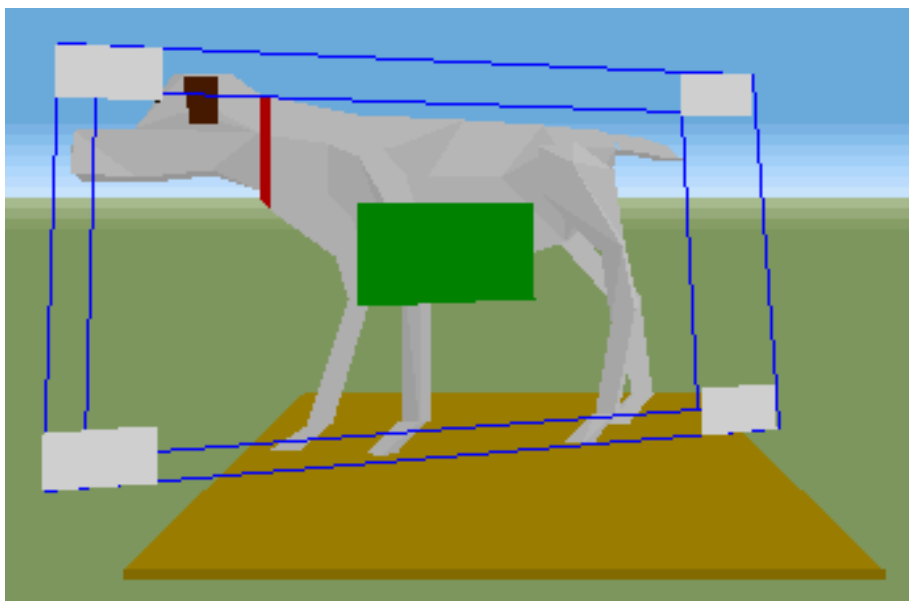


7. Rotating the object horizontally by dragging one of the horizontal lines.

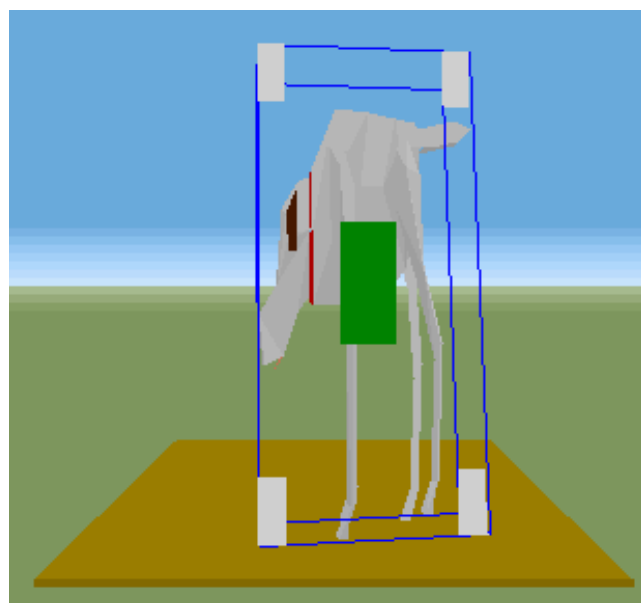
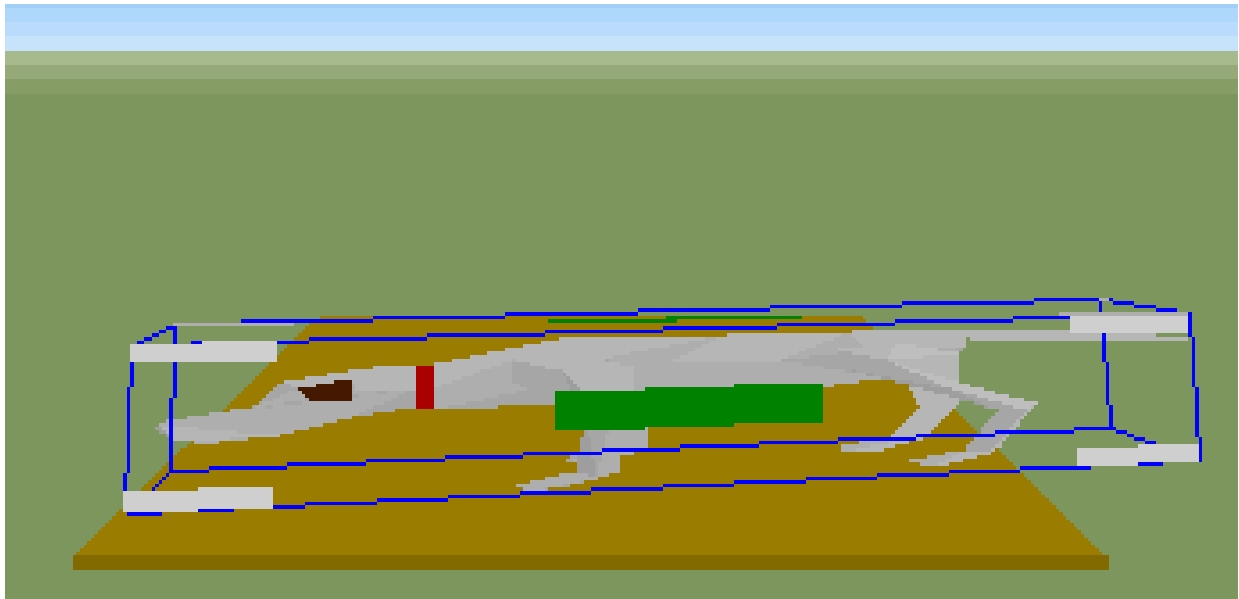


8. Moving the object from side to side or forward and back, by dragging the green grips.

9. Making the object bigger or smaller by holding the control key, and dragging one of the corner grips. Attempting to move or expand the object through the ground will be unsuccessful and it will turn red.



10. Dragging the corner grips without the control key permits the shape of the object to be altered. (The dog will still walk around regardless of the changes to its shape).



11. The range of sounds available. Adding sound to an object by dragging and dropping.
12. The range of colours and textures available. Adding colours and textures to an object by dragging and dropping.
13. Changing the ground and sky colours. Making an all black background for a space scene. Adding stars. Making an all blue background for the ocean.
14. The attributes window gives information about the actions, sounds, materials and position of the currently selected object.
15. Modifying actions using the attributes window, for example turning off gravity and allowing a figure to walk in the air.
16. Modifying sounds, for example raising and lowering pitch.
17. Using the Alt key to move an object down through the ground, for example to allow a figure to appear to swim in a pond.



18. Creating 3D text.



Evaluation

The program successfully met the criteria that I required, as follows.

1. Although I was very ready to change the format, it worked well in all the schools. As expected, younger students, and those with less computer experience, tended not to complete all the steps described. Nevertheless, at the completion of the tutorial all groups were able to continue working with the program without further help. All students were able to cope successfully with navigation and world building.
2. Feedback from schools indicates that students were able to master enough of the program basics in the introductory lesson to be able to develop their skills subsequently without intensive help from the teacher.
3. Feedback from schools also indicated that the students I had worked with successfully taught other students.
4. It was quite clear that the students in all the schools enjoyed learning the program. Not one student failed to participate in the tutorial, and very enthusiastic comments were the norm.

Do 3D appears to be very suitable for introducing primary students to VR. It may well have similar advantages for older students, but only primary students were involved in this study.

Conclusion

Successfully introducing VR to classrooms is, of course, important, but it is not an end in itself. The ultimate goal is to have teachers use it systematically for enhancing learning. When visiting the schools I offered teachers the following suggestions for using Do 3D in classrooms.

1. Study how plans give a bird's eye view of objects normally seen from the side. In a virtual scene it is possible to change gradually from a side view to a plan view. Students could create a 3D scene, then draw a plan of it, or create a scene from a plan supplied by the teacher.
2. Design something, then make the real thing, for example, a garden.
3. Develop an understanding of proportion by resizing objects.
4. Resize objects to approximate dimensions, for example, make a dog twice as big, half as big, etc.
5. Resize objects to precise dimensions displayed by the program. The student could print out the results to demonstrate completion of the task.
6. For advanced work, study how a 3D object's position can be specified according to three axes (x, y, and z). The orientation in degrees is displayed and students could change an object's position to specified orientations.
7. Modify 3D shapes such as cubes, cones and spheres, for example, making different shaped pyramids. Compare the effect of changing in three dimensions with changes to, for example, height and width but not depth.
8. Use 3D shapes, as supplied or modified, to build more complicated objects.
9. Use supplied objects to create 3D scenes, for example, to illustrate a story or design a furnished room.
10. Explore colouring and texturing for 3D art.
11. Use 3D's potential for imagination or fantasy in order to encourage creative writing. For example, create strange creatures by modifying ready-made animals and people, attach unusual sounds to objects, create strange scenes, use unusual ground and sky colouring, or create space or underwater scenes.
12. Experiment with various viewpoints, for example, an adult's view of a plant compared with a toddler's view and an ant's view.

Although the teachers I visited were willing to encourage their students to explore the new program, the majority so far have not reported systematic use of VR for achieving educational goals. Not all have given reasons, but lack of time is a common explanation. Seven teachers have reported the active use of VR in their classrooms, which includes the following work.

1. Studying VR as part of the technology syllabus.
2. Teaching plans to year 2.
3. Constructing scenes from stories.
4. Constructing 3D scenes from plans.
5. Resizing objects to specified dimensions.

In order to support the teachers I had visited, and to help other teachers who would like to begin using VR, I have developed a web site, located at <http://www.jcu.edu.au/~eddja>. It includes an introduction to VR, discussion on using VR in classrooms, and information on programs. There is also a page that lists other sites where teachers will find ready-made virtual scenes that could be useful in their classrooms. I see such sites as a very valuable aid for teachers. The practicality of teachers creating scenes for their students is doubtful, because the creation of complex 3D is time-consuming. A much more efficient alternative is to make use of scenes that are increasingly becoming available on the Internet. Some are of very high quality and could not be equalled by a teacher without considerable skill and the willingness to devote many hours to the creation of one scene. I plan to expand my listing of these scenes and to catalogue them. Using such scenes does, of course, extend the educational potential of VR beyond what could be achieved with Do 3D alone.

Note: Do 3D is a product of the Superscape Corporation (<http://www.Superscape.com>). Superscape reports that the Do3D product line is currently unavailable.

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